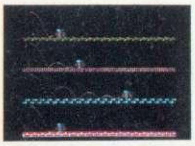
BBC · MASTER · ELECTRON · A3000 · ARCHIMEDES FEBRUARY 1991 £1.60

BBC ACORN USER



HAT TRIX
Pick up the hats in this exciting conclusion to our Beeb game



RHAPSODY
Tune in to our review of Clares' new music creation package



CHAOTIC!
Spin around the Lorenz Attractor and unravel Chaos on the Arc



NINE TO FIVE
Clock in and try the latest multi-functional office package

MAD ABOUT CAD

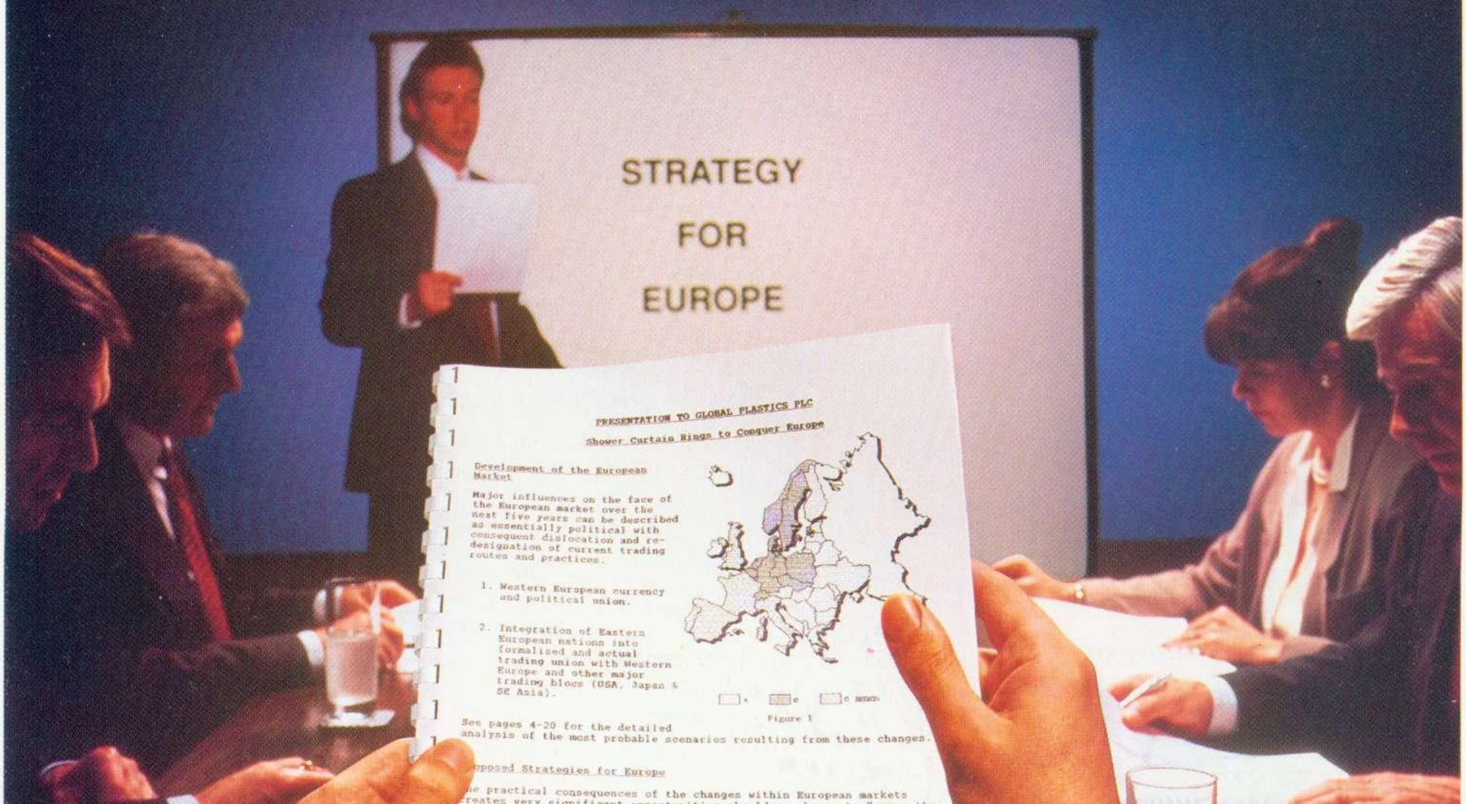
How to turn your designs into stunning 3D images



02

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The new Panasonic KX-P1123. For when you need to create the best impression.



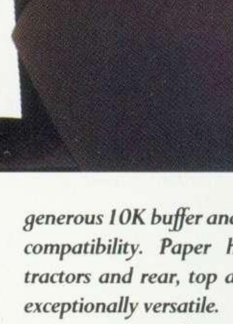


When quality matters, move up to Panasonic's 24-pin high performance dot matrix printer, the KX-P1123. With four Letter Quality fonts, document presentation is crisp, clear and black – simply stunning!

What's more, with a brisk speed of 63 cps, or up to 240 cps in draft mode, this is a professional printer with a huge appetite for work.

Outstanding value for money, the KX-P1123, with easy-to-use front panel controls, features a generous 10K buffer and full software and interface compatibility. Paper handling, with push/pull tractors and rear, top and bottom paper paths, is exceptionally versatile.

For more information, dial 100 and ask for Freefone Panasonic or fax Julie Everard on (0344) 853707. Remember, you never get a second chance to make a first impression.



A Panasonic Printer. A Computer's Perfect Partner.

Panasonic Printers

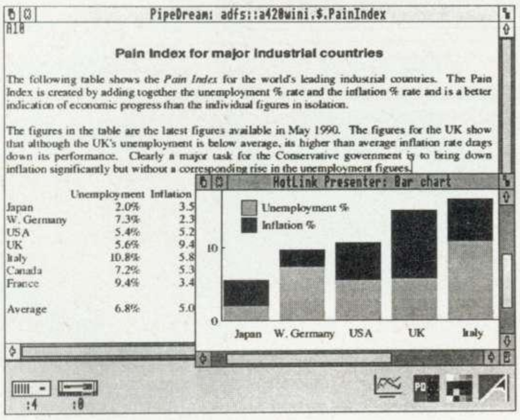
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BBC/2/91

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PIPEDREAM 3

WINNER
of the 1989/90 BBC Acorn User Award for Best 32-bit Business Software



The bar chart in the screen shown above was produced by using the HotLink between PipeDream 3 and HotLink Presenter.

Major features include:

- intuitive RISC OS user interface
- many documents loaded at once
- display and printing of pictures within text
- wysiwyg display including all RISC OS fonts
- built-in 93,003 word spelling checker
- file compatibility with PC & Z88 PipeDream & BBC View Professional
- natural, background recalculation
- keystroke compatibility with Z88 & PC PipeDream
- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
- automatic saving of VIEW, Lotus, Tab, CSV and Acorn DTP format files
- multi-field sorting
- 62 spreadsheet and database functions
- external references between documents for 3-D modelling
- macro file recorder
- slot protection

PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. With PipeDream 3, you can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

PipeDream 3 has been written to take full advantage of RISC OS – if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. PipeDream 3 can automatically load and save most popular file formats and is the first program to use the new RISC OS HotLink, which enables it to interact dynamically with Archimedes graphics programs, such as *HotLink Presenter* from Lingenuity and *GraphBox* from Minerva.

As well as winning the 1989/90 BBC Acorn User Award for Best 32-bit Business Software, PipeDream 3 was runner-up in the Best 32-bit Educational Software and Best 32-bit DTP/Word Processor categories.

PipeDream 3
Breaking down the barriers

POWER • SPEED • FLEXIBILITY • EASE OF USE

PipeDream 3 is for all Archimedes computers with 1Mbyte or more of RAM, including the A3000.

For a free brochure, see your Archimedes dealer, or phone us on 0954 211472, or return the coupon.

PipeDream 3 costs £147.00 + VAT.

For a free brochure, complete and return this coupon to the address below.

PipeDream 3 ☐ View Professional ☐

Name ______________________

Address ______________________

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colton software

Colton Software,
Broadway House,
149–151 St. Neots Road,
Hardwick,
Cambridge CB3 7QJ,
England.
Tel. 0954 211472 Fax. 0954 211607.

BBC ACORN USER

FEBRUARY 1991 ISSUE No 103

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Cover photograph by George Snow

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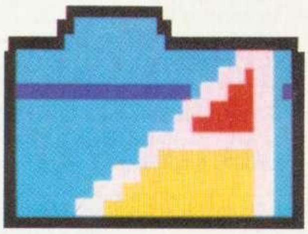
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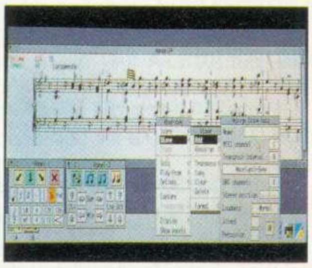
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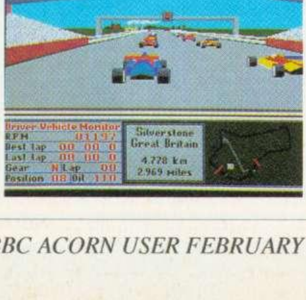
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COMPANY BUILT ON NEW FOUNDATION

Two well-known companies in the Acorn field – Oak and Software Solutions – have merged.

The new company, Oak Solutions, is to develop software and hardware products, starting with an educational applications series called *Foundation*.

Products will be marketed under the Oak Solutions and Worra labels. The new company will trade from Oak's base in Leeds, with research and development based in Cambridge.

Commenting on the merger, David Tee, a senior spokesman for Oak Solutions said: 'Over the past year, Software Solutions and Oak have been working closely together on the development of *Genesis II* and the Foundation series products. This collaboration has highlighted the complementary skills of both companies. By pooling our resources, we believe that we are uniquely equipped to lead the way in the development of innovative Archimedes products through the nineties.'

Foundation is a series of curriculum resource applications based around an interactive multi-media educational database, designed for all areas of the National Curriculum.

The system is supplied with a range of editors and tools, as well as curriculum specific data which can be customised using the *Genesis II* editor.

The Design Processor is the first product to be released in the *Foundation* series. A range of peripherals and software will be announced later this year.

ARCHWAY 2 RELEASE

Version 2 of *Archway*, the environment for creating Risc OS applications in Basic, has just been released by Simtron.

Completely rewritten, release 2 includes all tools and is fully windowed and multi-tasking. It is designed to allow any Archimedes owner to quickly achieve results using Basic. Powerful applications can be created without any knowledge of the complexities of WIMP and beginners can develop their knowledge of Basic while staying within the familiar windowed enviroment.

A simple Risc OS drag save operation creates a new application shell (a shell is a fully working program that will run and load on the icon bar).

To complete an application, the programmer creates or extends windows and menus and writes Basic code to handle the application's tasks. Extensive graphics handling is built in to display *Edit*, *Draw*, *Euclid* (3D) and *Mogul* (film) files in windows without programming. Graphics can provide a background for the whole window and/or be put in frames within the window.

The user guide has around 50 program building sessions, with more than 30 example applications included on disc.

The complete system comes on four discs. An Archimedes or an A3000 with 1 Mb or more of Ram and Risc OS 2 is required. Two no-charge upgrade request forms are included and there is no extra licence fee for registered users. *Archway 2* costs £99.95 including VAT and p&p. Contact Simtron, 4 Clarence Drive, East Grinstead, West Sussex RH19 4RZ. Tel: (0342) 328188.

DT FOLIO

Development delays over, ESM has just launched *Desktop Folio*, a wordprocessor, desktop and interactive publisher.

According to ESM's divisional director, Ysanne Heald, the technology being used in the package is so advanced that 'we need permission from Acorn to use it. We are excited about the product and eager to provide schools with what we know to be a superb package.'

The prototype has been well received by advisers in education. At the time of going to press, the package was set for launch at BETT 91.

Designed for the Archimedes, *Desktop Folio* costs £90. Primary and secondary licences are available. Contact ESM, Abbeygate House, East Road, Cambridge CB1 1DB.

ARC PORTABLE SOON

Following the formation of a joint venture between Acorn and Apple (see last month's *BAU*), the race is on to launch the first portable Arm-based computer.

With the formation of Arm Ltd, the new Acorn/Apple company which will work on Arm chip development, Acorn is set to develop its marketing towards the growing portables market.

Acorn's marketing director, Mike O'Riordan, has confirmed the company's intention to launch a portable Arc later this year. Colour screen technology has been evaluated by Acorn, but a colour portable may initially be ruled out due to cost.

The further development of the Arm chip, with its high perfomance and low power consumption, makes the production of a portable highly likely. However, Acorn will not be alone in pursuing this goal, since the technology developed by the new Arm company will also be licensed to other manufacturers.

The education market, where Acorn dominates, would be a key target for an Arc-type portable. Teachers and students can move computers between classrooms, or take machines home.

There are two other Arm-based portables waiting in the wings. In the final design stage is a portable designed by Mike Harrison, who is responsible for many of Watford Electronics' Archimedes peripherals.

The second is being produced by the Active Book Company, run by Hermann Hauser, one of Acorn's founders. This advanced prototype could be in production later this year.

ART QUEST

Are you good at producing creative *Draw* files on the Archimedes? If so, 4Mation of East Sussex is interested in seeing your work.

Dave Caughley and Paul LeBeau, who programmed 4Mation's *Poster*, are working on a modular clip art application, called *smArt*. This will let users to customise drawings.

For example, a drawing of a car will have a number of different fronts, backs and wheels.

Although a couple of people are working on drawings for *smArt*, 4Mation would like to hear from any readers who would be interested in producing *Draw* files for the product.

Contact Mike Matson, 4Mation, Little Dormy, Five Ash Down, Uckfield, East Sussex TN22 3AP. Tel: 082-581 2679.

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Published by Redwood Publishing, a BBC Enterprises Company, 20-26 Brunswick Place, London N1 6DJ. Tel: 071-490 1444. Telecom Gold 81: RED001, Micronet 919992492. Printed by Riverside Press, Gillingham. DTP page make-up by Pressgang Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ. Typesetting by CB Origination, 182 Pentonville Road, London N1 9LB. Colour by Trumps Studio, Ware, Herts. Distributed by BBC Frontline, Park House, 117 Park Road, Peterborough. ISSN 0263 7456



SCSI HARD DISC DRIVES AND INTERFACES FOR THE A3000

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- Metal case with power supply
- Fully screened SCSI connectors and cable
- Easily daisy-chained to provide multiple drives

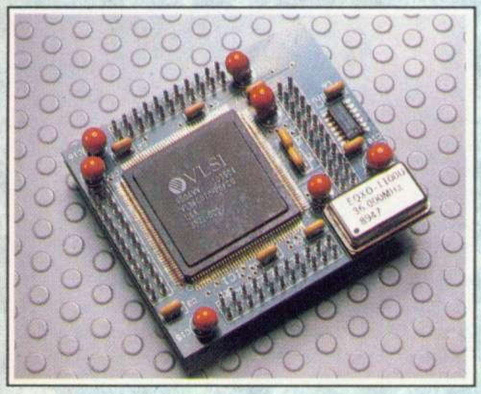
Beebug have launched a full range of SCSI hard disc drives for the A3000 with capacities from 20Mbyte to 338Mbyte. These are all half-height quality drive mechanisms housed in an attractive case with an internal switch-mode power supply. Included in the price is a high quality screened SCSI cable and an 8 bit SCSI interface, which fits neatly inside the A3000 module slot. This is supplied with full fitting instructions and may be fitted in minutes. No soldering or specialist skills are necessary.

A number of drives may be daisy-chained together to give increased capacity. All drives are supplied with through connectors and the appropriate cables, but units in the middle of the chain require a set of terminating resistors to be removed. We can supply the drives with these already removed. See opposite for ordering details.

SCSI HARD DRIVES INCLUDING A3000 INTERFACE

Stock code	*Capacity*	*Price (ex. VAT)*
5220	20Mbyte	£398.00
5221	49Mbyte	£498.00
5222	80Mbyte	£598.00
5224	110Mbyte	£798.00
5223	183Mbyte	£898.00
5225	338Mbyte	£1198.00

Carriage is £8.00 per drive. Add 10 to stock code for drives without terminators (e.g 5220 becomes 5230). Drives are available without interface - deduct £99.



ARM3 PROCESSOR CARD

- Massive speed increase
- Riscware control software
- Comprehensive user guide
- Compact design using latest surface mount technology
- Compatible with all software

Stock code: 0134

£399.00

(+ VAT + £5.50 Carriage)

The ARM3 micro-processor is the latest in the series of Acorn RISC Machine reduced instruction set processors. It is the micro-processor fitted as standard to Acorn's new flagship - the 540.

This new card from Beebug allows a super-fast ARM3 processor running at 32 MHz to be fitted to your Archimedes 300 or 400 series computer. The highly compact circuit board measures just 55 by 60 mm (approx) and contains the latest surface mounted ARM3 processor together with a clock generator circuit.

The ARM3 Card is inserted in place of the existing ARM2 processor and provides a four-fold increase in processor clock speed along with a 4Kbyte cache which serves to isolate the fast processor from the relatively slow RAM. Average speed increases of 3 to 5 times are typical, and unlike speed enhancers such as floating point co-processors, the ARM3 Card improves performance of all software. Users of the PC Emulator will especially benefit from the increased execution speed.

The ARM3 Card is supplied with disc-based software to control the cache operation, both from the Desktop and via star commands. The comprehensive user guide not only covers the control of the ARM3 card at all levels, but also contains details of differences between the ARM2 and ARM3, and a section explaining the theory of cache systems.

Note: The Beebug ARM3 Card must be fitted by an Acorn approved component level service centre, as the existing ARM 2 chip has to be removed. This includes Beebug and many major Acorn dealers. The Beebug ARM3 is unsuitable for the A3000, as the ARM2 processor in this machine is soldered directly to the circuit board.

BEEBUG

Beebug Ltd., 117 Hatfield Road, St Albans, Herts, AL1 4JS.
Tel. 0727 40303 Fax. 0727 860263

Please add VAT at 15%. This advert was produced entirely with *ovation* DTP

THE EXPANDING A3000

A new expansion box from Wild Vision now allows Archimedes expansion cards to be used with the BBC A3000.

The A3000 expansion box fits into the rear expansion port of the computer and holds two full-width or three half-width cards. This will enable all Arc podules designed to Acorn standards to operate with the A3000.

The backplane of the unit has multi-layer construction to ensure minimum signal timing changes – important for high performance cards such as Wild Vision's Hawk V9 colour digitiser which uses the MEMC interface at its maximum speed.

The expansion box is provided with an external 12 volt power supply and is protected by a power protection relay.

Priced at £139 plus VAT, Wild Vision is also offering the box with the Hawk V9 digitiser for an introductory price of £399 plus VAT, saving £79 on usual list prices.

Contact Wild Vision Ltd, 15 Witney Way, Boldon Business Park, Boldon Colliery, Tyne & Wear NE35 9PE. Tel: 091-519 1455.



Wild Vision's expansion box holds two full-width podules

NEVER A CROSSWORD

Panda Discs has launched three £9.95 additions to its range of software for the Beeb and Master 128.

- *Touch and Learn* is a content free Concept Keyboard package that will suit both primary and special needs applications. Questions can be answered by touching overlays on the board, and a score is given at the end of each run.
- *Windows* is used with *Wordwise Plus* and enables green embedded commands to obtained through pull-down menus. Complex operations, such as paging, are taken care of by Draft Print and Final Print options. Commands include centering, underlining, bold, indents, and so on.
- *Catalogue* is an information storage system for *Wordwise Plus*. Ideal for storing and searching record collections, sets of slides, names and addresses, the software is fully auto-booted and menu driven.

Panda has also improved its *Xword* package. Just send in your original disc with return postage for a free upgrade.

Contact Panda Discs, Four Seasons, Tinkers Lane, Brewood, Stafford ST19 9DE.

ENHANCED BEEB EMULATOR

An enhanced BBC Model B emulator has been released by Acorn. The new version provides better emulation than the version of !65Host on the Archimedes applications discs.

Aimed primarily at education, the new emulator should help schools and colleges to migrate to the A3000/Archimedes computers.

The software comprises an improved version of !65Host, which emulates the Model B on an Arc, and includes utilities to help transfer and modify and port 6502-based programs into Risc OS.

A comprehensive manual supplied with the emulator covers all aspects of emulation and continuity, including legal issues. This is available as an A5 bound copy, as A4 loose sheets (to facilitate photocopying) and electronically on disc.

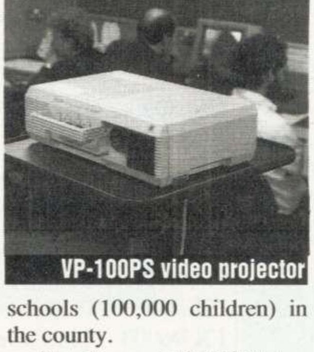
The disc will be generally available at the discounted price of £19.55. Write to Acorn Direct, 13 Dennington Road, Wellingborough, Northants NN8 3RL.

PROJECTORS FOR SCHOOLS

Video projection looks set to benefit IT teaching in Northamptonshire schools.

Two Epson video projectors valued at over £3000 each have been purchased by the Northamptonshire Computer Education Centre (NCEC).

The video projectors are compatible with Acorn computers and will find extensive use in the NCEC's computer room, which has a display area for up to 50 people. The NCEC also expects regular requests from teachers to borrow the projectors for graphics presentations to groups of schoolchildren.



VP-100PS video projector

The NCEC serves 350 schools (100,000 children) in the county.

The Epson VP-100PS has an RRP of £3250 and is available from dealers. Contact NCEC, Covington Street, Northampton NN1 5JU.

C64 TO BEEB

If you currently own a Commodore 64 and a BBC micro, but want them to interact, then the Commate Rom is for you.

It allows you to use Commodore peripherals with the Beeb, and makes it possible for C64 users to shift to the Beeb without losing the use of their original equipment.

Commate offers the Commodore Disc Filing System (CDFS) which allows BBC programs to address Commodore disc drives. The exchange of files between the BBC and C64 machines is possible and a special option is provided to translate the BBC character set to the idiosyncratic Commodore set.

There's a dedicated printer driver built in, which makes a Commodore printer act just like a normal Centronics parallel printer.

A comprehensive manual and reference guide describes the CDFS system and Commate Rom is supplied with the BufferBox interface that connects the user port and accepts the serial bus cable.

The Commate Rom costs £49.95 plus VAT and is available from Lighthouse Software, PO Box 3822, 7500 DV Enschede, Holland.

ACORN TO PC

If you want to link up your Acorn machine to a PC, but you are not sure about relevant connections and compatibility, a new book on the subject might be what you need.

Called *Acorn to PC*, this handy reference guide is designed to advise users of BBC B, Master, BBC A3000 and Archimedes machines on how to bridge over to the MS-DOS world.

Written by Dr John Lockley, co-author of the *Complete BBC Computer User Handbook*, the book shows how and where the two systems (Acorn and MS DOS) differ. *Acorn to PC* runs to 250 pages and costs £15.95 from Watford Electronics, Jessa House, 250 Lower High Street, Watford WD1 2AN. Tel: (0923) 37774.

NEW MUSIC FOR SPECIAL NEEDS

Two new music education software packages have been developed for children with special needs.

Soundshow provides over an hour of pre-recorded music for listening exercises and is aimed at users whose disabilities prevent access to a non-computerised music source, such as a record collection.

The second package, *Soundscore*, helps all children compose music using a 'graphic score' – a direct visual representation that shows the pitch and length of notes without the complexities of the musical staff.

It also provides strong links with art and maths. The final score can be saved to disc and printed in a variety of sizes.

Soundshow and *Soundscore* are part of Hybrid's *Sound Worlds* family and operate with the Music 5000 synthesiser on the BBC model B or Master. Each costs £29 plus VAT.

● Hybrid Technology has expanded its music system and now offers 10 system packages, ranging in price from £99 to £729.

Details are available from: Hybrid Technology Ltd, 273 The Science Park, Cambridge CB4 4WE. Tel: 0223 420360.

SCSI NETWORKS

SCSI interface manufacturer Lingenuity has teamed up with Software Solutions to produce a new networking solution for the Archimedes and BBC A3000 machines.

Called *SCSI Share*, the system uses high speed SCSI protocols to allow a number of computers to access a single hard drive simultaneously via the Lingenuity SCSI interface.

SCSI Share is suitable for use in education, where groups of floppy disc or Econet-based Archimedes/ A3000 machines are in use.

Evaluation sites are being set up and application forms to become an evaluation site are available from: Lingenuity, Wood Farm, Linstead Magna, Haleworth, Suffolk IP19 ODU. Tel: 098 685 477.

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Competitive Pricing

BEEBUG

The Archimedes Specialists
Superb Service

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1170b	Easiword (Minerva)	33.95
1975b	Premier 3 (Circle Software)	70.00
5462b	Premier 3 WP application	23.00
1088b	Protext 5.0 (Arnor)	130.39

Spreadsheets

0954b	Intersheet II (CC)	24.95
1084d	Logistix (Acorn)	89.00
1998b	Schema (Clares)	107.35
0931b	Sigmasheet (Minerva)	43.44

DeskTop Publishing

1089c	Desk Top Publisher (Acorn)	125.00
1113c	Impression II (CC)	158.00
1115b	Impression Junior (CC)	89.00
1077b	Tempest (Clares)	125.00
0108b	Ovation (Beebug)	99.00

Integrated Packages

5427b	Desktop Office (Minerva)	109.95
0901d	Pipedream 3 (Colton)	125.00

Databases

1913b	DataVision (Silicon Vision)	123.86
1992b	Flexifile (Minerva)	125.95
0987c	Flying Start II (Mitre)	84.95
1900b	Genesis (Software Solutions)	79.95
5460b	Carousel (for Genesis)	39.95
5448b	Genindex (for Genesis)	29.95
0910b	Knowledge Organiser (Clares)	45.00
0100b	Masterfile II (Beebug)	19.13
0989d	Multistore (Minerva)	199.95
5447b	Squirrel (Digital Services)	129.00
0921c	System Delta Plus vII (Minerva)	55.00

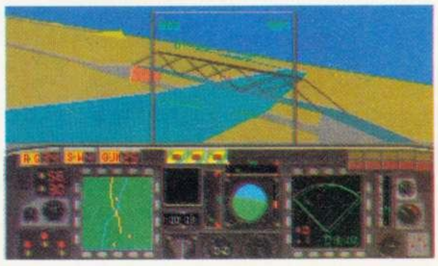
Accounting Packages

5458d	Business Accounts (Minerva)	379.95
0947b	Home Accounts (Minerva)	40.00
1159c	MicroTrader Accounts	199.00
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1914d	Office Tools (Silicon Vision)	299.95
1917b	Share Holder (Silicon Vision)	161.09



Arcade Games

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1995b	Chock Away (4th Dimension)	20.62
1187b	Conquerer (Superior)	19.00
0952b	Corruption	20.61
1979b	Drop Ship (4th Dimension)	16.48
1070b	E-Type (4th Dimension)	16.48
1058b	E-Type Designer (4th Dim.)	14.00
0999b	E-Type Extra 100 miles (4thD)	14.00
1929b	Fireball 2 (CIS)	21.70
0944b	Fish	20.64
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1903b	Nevryon (4th Dimension)	17.35
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1999b	Pysankie (4th Dimension)	16.48
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5451b	Starch	13.00
0990b	Stranded	24.74
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5452b	Superpool (4th Dimension)	17.35
0998b	The Olympics (4th Dimension)	16.48
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5453b	Wimp Game (4th Dimension)	17.35
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1179b	Zarch (Superior)	16.48



Languages

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0897c	ABX Utils for ABC (Dabs)	44.00
1085d	ANSI C release 3 (Acorn)	128.95
0107c	ISO C Dev. System (Beebug)	77.39

Music & MIDI

1091b	Armadeus (Clares)	66.21
0904c	EMR Creations set (6 discs)	43.39
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1971b	EMR MicoStudio	68.70
0995d	Iinspiration (Pandora)	260.00
0239f	Pandora PMI-4 Midi Interface	179.95
1997b	Rhapsody (Clares)	41.36
5457b	Tracker (Serial Port)	41.95

Utilities

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0102a	DFS Reader (Beebug)	9.06
0106b	Hard Disc Companion (B'bug)	33.91
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0796b	Serial Link Disc (Beebug)	15.79
1908b	Star LC10 Colour Driver (Ace)	14.95

CAD

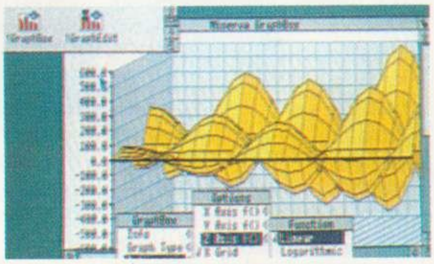
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0913c	PCB + autorouting	161.95
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1103c	Artisan II (Clares)	54.95
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0937c	Pro-Artisan (Clares)	79.95

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1976b	FontFX	10.00
1938c	Mogul (Ace)	19.00
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1078c	Render Bender (Clares)	58.00
1912c	Solids Render (Silicon Vision)	123.87



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Outline Fonts

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0935b	Dread Dragon Droom	25.95
1193b	Fun School II (0-6 years)	16.48
1194b	Fun School II (6-8 years)	16.48
1195b	Fun School II (8+ years)	16.48
1150c	Jigsaw (4mation)	29.00

Books

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1246b	Archimedes First Steps	9.95
1243c	Arch Operating System	14.95
1208b	Basic V : A Dabhand Guide	9.95
1245g	RISCOS Prog. Ref. Manual	79.00
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MASTERING KEYS

ScanMaster is a new hardware/software system for severely physically disabled computer users, particularly those unable to work with a keyboard. It is based on the Master 128, modified by adding a proprietary video board. This, in turn, drives an ordinary colour monitor.

The user interacts via a single switch, controling a scanning grid on an extra monitor which shows keywords or commands for any program.

Developer Roberts Wills (author of the original *Folio* wordprocessor) sees two distinct markets for ScanMaster: special education schools and adults with severe physical handicaps.

The system comes with a bundle of modified software, including a wordprocessor (an extension of *Folio*), a bundle of games and flexible facilities for keyboard emulation. It can also run a large number of popular educational packages such as *Podd* and *Granny's Garden*.

Robert is currently working on *Image* – he wants to create a catalogue which lists the educational packages that work with the system and the special discs which are available.

A pre-release version of ScanMaster was demonstrated at last year's Naidex exhibition. The software is now essentially complete, although minor changes are being made in response to comments made by trial users.

With a view to providing customised scanning grids to drive important programs, Robert is currently collecting information on a wide range of packages from major educational software suppliers.

He is also looking at the possibility of releasing the scanning grid development tools to developers and technically-minded users who want to modify their own software.

Once ScanMaster is in people's homes, Robert will be running a back-up service to help users with any technical problems they may encounter.

Hugh Steeper Ltd is manufacturing and distributing the ScanMaster system. For further information contact the company at 237-239 Roehampton Lane, London SW15 4LB.



Last November's Resource conference was attended by more than a thousand delegates. They came from all over the country, although mostly from the Resource area. The theme was 'IT across the curriculum - a celebration' and schools minister Michael Fallon picked up on this, asserting that over the years much had been achieved in the field of educational IT and there really was cause for celebration. He also gave a sneak preview of the results of the most recent DES survey into computers in schools. According to the department's figures, there is currently an average of 4.3 micros in primary schools, up from 2.5 in 1988. In secondary schools the number is 41, as compared to 23 in 1988. Mr Fallon's comment was that this represented 'considerable progress'. The results of the March 1990 survey should be published later this year.

Two for Joy

Longman Logotron has released *Magpie* and *Revelation*, two impressive new educational packages for the Archimedes/A3000.

Magpie is a multi-purpose program designed for project work in primary and secondary schools, although it oculd equally be used for business presentations. It's an authoring system which allows children to build pictures, text and soundbites into 'binders'. They can construct buttons to link the different screens in any way.

It can be used with sound-sampling boards, such as Armadillo and Armadeus, and can also be converted into a simple but nonetheless effective DTP system (it supports the Acorn Outline Font Manager).

Revelation was developed at Homerton College in Cambridge where *Image*, revolutionary in its time, was written.

Essentially, it has all the facilities of an advanced paint package but it's particularly interesting because it can handle the input of pictures from other sources and process them to produce completely new and different images. The other sources may be digitisers, scanners or video frame grabbers.

Until the end of March both packages are on special offer – *Magpie* costs £39 and *Revelation* is £54 – so get your orders in quickly. Longman Logotron is at Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.

Lisa Hughes

NEWS IN BRIEF

● Beckside Farm is a *Touch Explorer Plus* resource pack, from the Cumbria Information Technology Across the Curriculum project. It's a collection of overlays and files about a Lake District hill farm, for a BBC micro and a Concept Keyboard.

This is Cumbria LEA's first venture into resource publishing and it has proved popular with local schools.

Anyone else can obtain the pack for the very reasonable price of £5.50. The address to write to is CITAC, Resources Section, Education Department, 5 Portland Square, Carlisle CA1 1PU.

● *Graphite*, from Keep IT Easy, is a graphics and sprite generator for the BBC B and Master 128. Although it's aimed at all ages, abilities and subject areas, it will be particularly useful in science, technology and geography lessons.

Also for the Beeb and Master from Keep IT Easy is *Mattim*, a timing and counting program which allows pupils to experiment with data capture.

Different sprite sets are available for *Graphite*, ranging in price from £6.50 to £13.50. *Mattim* is only £5.50. Keep IT Easy (or KITE) is at PO Box 29, Nuneaton, Warwickshire CV11 4TT.

● The long-awaited *Desktop Folio* for the Archimedes is ready for release. According to publisher ESM, there are two reasons for the delay: the technology it employs is so advanced, Acorn had to give permission for its use and programmers needed time to incorporate the extra features requested by teachers.

Desktop Folio is a wordprocessor/DTP package. A single copy costs £90. Primary and secondary site licence are £250 and £375 respectively. ESM is at Abbeygate House, East Road, Cambridge CB1 1DB.

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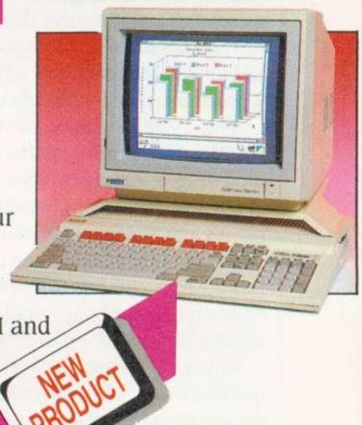
HOTLINK PRESENTER

TALKS TO PIPEDREAM 3

For the first time, two Acorn applications can communicate with each other in real-time in the RISC OS environment.

HotLink Presenter includes all the features of Presenter II (the professional graphics programme which enables you to present your data graphics in bar, pie or line format) with the additional benefit that it can be updated automatically from Pipedream 3.

Updates are available for existing Presenter II and Presenter users, as well as site-licences for multi-station installations.



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FIDO AT THE ARCADE

The World of Cryton and Arcade Bulletin boards have now become members of the extensive FIDO network. No, it's not a furry four-legged beast, but a complex interface between hundreds of bulletin boards around the country. FidoNet began life early in 1984, when communications was in its early days and the domain of the true hobbyists and enthusiasts. It started in San Francisco, more or less: 'just for the fun of it; to see if it could be done'.

Now it is a complex system allowing your message to travel around the country, reaching a much wider audience than a single bulletin board. The basic purpose of FidoNet is very simple; It's a hobby, a non-commercial network of computer hobbyists who want to play with, and find uses for, packet switch networking (PSN). Not being a commercial venture, FidoNet is totally supported by its users and sysops, and in many ways is similar to ham radio, in that other than a few 'stiff' rules, each sysop runs their system in any way they please, for any reason they want.

The rules are actually fairly straightforward and obvious; to let other sysops know if your system is going to be down for any lengthy time, or if you change your phone number – imagine some poor person being woken up every night by the phone ringing every two minutes at 4.00am! Next time you log onto the World of Cryton (0749-679794, scrolling, 8N1) or Arcade (081-654-2212, scrolling, 8N1) do take a look around, and if you do leave a message, you could find it being echoed to bulletin boards across the country within 24 hours.



ArcTerm 7: fully comprehensive

It's faster with Fred

Micronet, the UK's biggest viewdata network, run by Prestel, has developed a new version of its CET standard for downloading files from viewdata systems. CET has long been notorious for giving slow download times, especially when using ARCed files. As Prestel uses only seven-bit data, any files transferred must first be converted from eight-bit format into seven-bit before they can be CET encoded. The encoding process can actually add 160 to 170 per cent to the original length of the file (yes – 2.5 times longer!).

Now a new FCET format is in operation, which ensures that a file can never exceed 25 per cent of its original length – leading to much decreased download times, and hence cheaper phone bills. Micronet is hoping that FCET will become a new standard protocol for all viewdata systems, and is encouraging software producers to include FCET converters in future communications packages.

If you require more information, I can supply more detailed documents explaining the technical specifications on receipt of a blank formatted disc (Beeb or Archie). Next time you log on to Micronet and download a lengthy file, you'll immediately notice the difference.

Arcterm 7

By the time you read this, The Serial Port's long awaited sequel to the popular *ArcTerm 6.01* package should be readily available from your local dealer. ArcTerm7 is a fully comprehensive communications package for all Archimedes machines.

Running within the Risc OS desktop environment, it has all its advantages; downloading a file simply by dragging it to the relevant directory, being able to use your machine while downloading lengthy files, full support for xmodem to zmodem, including CET and Kermit.

A full script language is also provided, with which to customise any of the many powerful features. Host mode will even allow you to set up your own simple bulletin board, catering for message gathering and mail between multiple users.

Arcterm 7 is available from The Serial Port at £79.95. Users of existing packages such as *Hearsay* and *ArcComm* who upgrade can import their existing telephone directories and viewdata framestores, if they decide to upgrade.

The long-awaited multitasking version of *Hearsay*, from Beebug, should also be under way by the time to read this, so as they say 'Watch this space for details'.

Paul Vigay

NEWS IN BRIEF

● Panda Discs now has 16 volumes crammed full with Music 5000 files, which are available for modem owners to download via the DCT DATABASE. Get in contact by phoning 0384-239944 (viewdata) or 0384-238073 (viewdata/scrolling).

A pamphlet detailing titles can also be obtained by sending an sae to: Panda Discs, Four Seasons, Tinkers Lane, Brewood, Stafford ST19 9DE.

● For all of you who like to log-on when you're on the move or away from home, NEC has released a range of modems that are designed for specific use with car phones.

Called the ProLink CDLC (cellular data link control), prices start at £495 for an MNP model capable of communicating at v21,v22,v24 and v22bis.

● 2400 baud and faster now seems to be the growing standard for modems – and the prices of the devices are rapidly dropping.

Racal has launched a new range of low-priced Maxam modems to give you the increased benefits of v22bis, v32, v32bis and v42bis. Prices start from only £399.

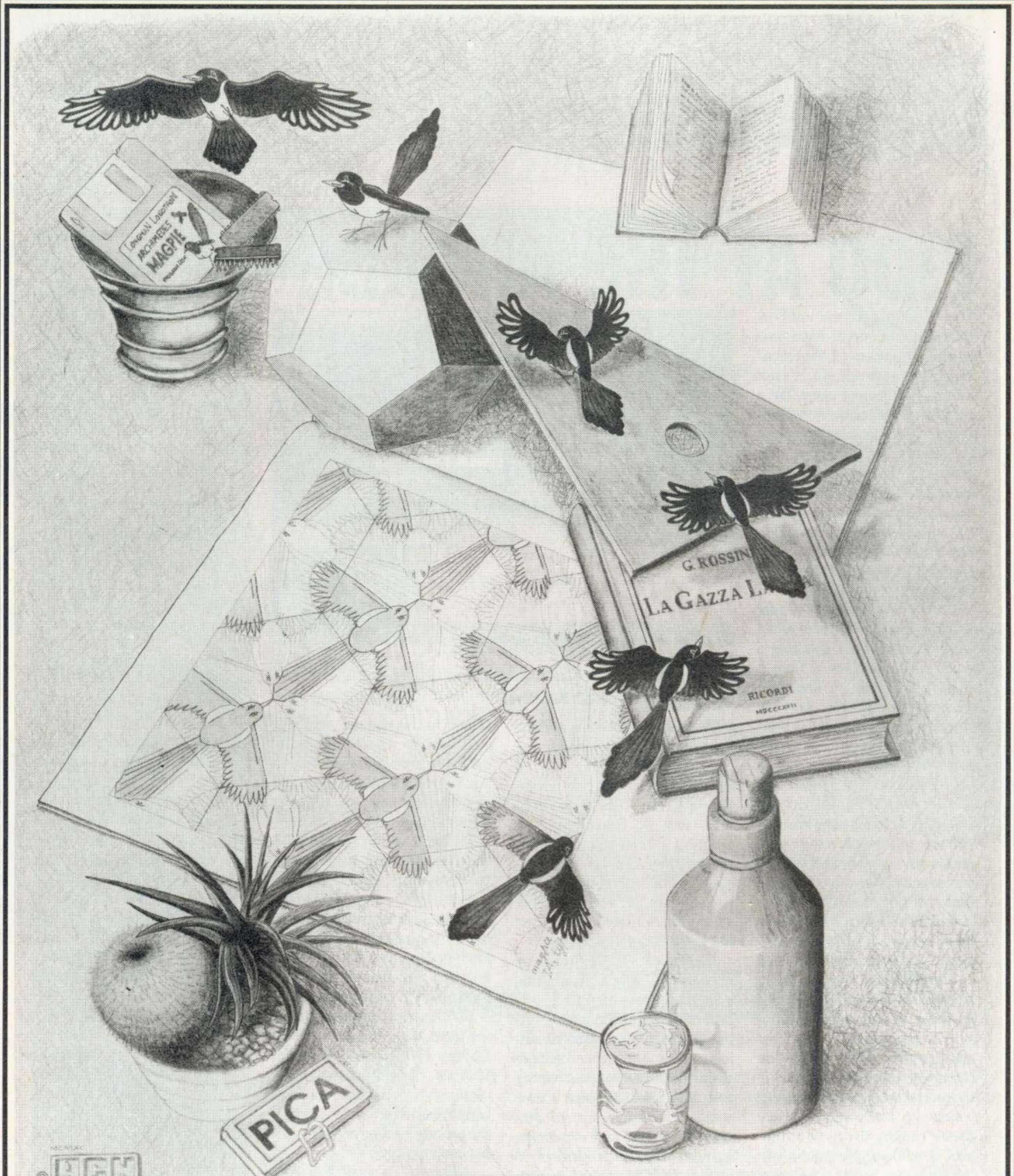
● Plug time – if you are the sysop of a bulletin board that supports the BBC and Archimedes, then please let me have details.

You never know, it could be your board that is featured here in future months.

Do you run a bulletin board? Or do you have an axe to grind with someone who does? Or maybe you want to praise them...

In any case, all communications about communications are welcomed. Contact:

Paul Vigay
BBC Acorn User
20-26 Brunswick Place
London N1 6DJ
Micronet 919992492


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PUBLIC KNOWLEDGE

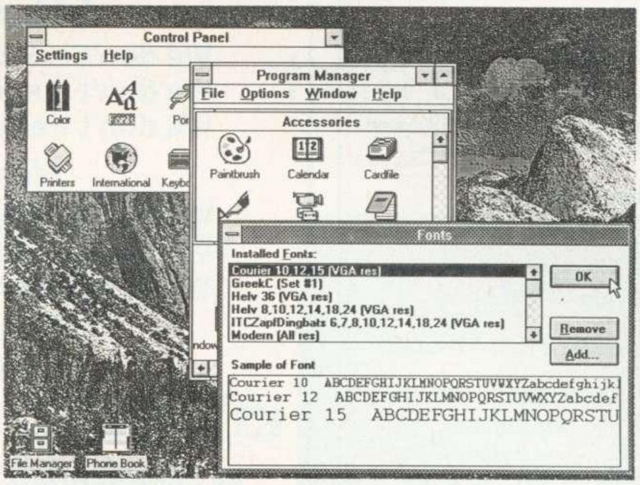
Running MS DOS or DR DOS on either the Archimedes or the Master can be quite a shock, more so on the Desktop-based Arc. Both DOSs are command line based, more akin to the star commands system of the BBC micro. There are, though, a few useful and low-cost extras.

One of the most useful is a tiny program called *Dosedit*. This lets you edit the command line, or any of 12 previous command lines, which can be flicked through with the up and down cursor keys. The left and right cursors are used to move along the currently displayed command line and you can overtype or insert characters to modify its contents. Pressing Return executes the new command.

Another goody is *List*. This is a file viewer for Ascii files which not only scrolls and pages back and forward through them, but can also search for words or phrases within the file. *List* can also filter out the high bits of characters in text files created with wordprocessors such as *WordStar*. The latest version, *List Plus*, provides basic file management functions, printing of files, multiple viewing windows and a file selector from within the program.

A third useful utility is an Ascii scanner, such as *Scan*. This will look through any file and extra the printable Ascii characters from it. If you need to examine a command or executable file (.COM or .EXE) to check prompts, error messages or version details, this is the easiest way. To look at the machine code itself, of course, you'll need a hex editor.

One easy-to-use utility for hex byte editing is *Fred*. This program uses both hex and Ascii displays, can search through a file for specified bytes or characters, and even includes a simple game for those moments when nothing seems to come right. It's available for £15 from its author Steve Godwin, at Alexander House, 50 Cavendish Road, Sutton, Surrey SM2 5LN.



Windows 3 – could Arc users experience it?

The other programs mentioned here are all in the public domain or are sold as shareware. One source, though there are probably many others, is Shareware Marketing, Beer EX12 3HW Phone them on (0297) 24088 for details or a catalogue.

Windows 3

There's currently a lot of talk in the PC world about Windows 3. This is a graphical user interface, similar in some respects to Risc OS, but lacking some of the finesse of Acorn's GUI. What excites PC users is the consistency of the programs that run under Windows 3, and that it 'gets around' some of the software limitations of MS DOS.

The main restriction on PCs is of course the 640K main memory limit. Using Windows 3 on a 386 or 386SX-based PC you can directly address up to 16Mb and use areas of a hard disk as 'virtual' memory (the computer sees the disk as part of its memory map).

But what advantage is all this to the Archimedes owner, running the PC emulator (Windows 3 will never be available to Master 512 owners, as it needs at least 640K to run)? At the moment, using versions 1.33 or 1.34 of the emulator, not a lot, but we may still see a PC emulator out of Acorn with improved resolution – perhaps EGA – and a little more wellie.

In the meanwhile, Windows 3 can be made to run with a CGA screen and is also capable of running on a 'basic' 640K PC. It does work entirely in the PC's graphic modes, though, and will end up running incredibly slowly on a standard Arc.

But with an Arm 3 in your Archimedes you're looking at basic PC AT speeds, and this is enough to get Windows 3 running adequately. You will also need a hard drive on your machine, as the Windows 3 code is large and uses overlays.

If you can meet these requirements, you have access to a lot of newly-written or revised PC programs. More and more software is being written for this standard and many see it as the way forward for PC software. It begins to give the PC the consistent interface it has so long needed. Rather than writing for a machine with any number of different configurations, software authors write for Windows and let the interface handle the hardware aberrations.

Simon Williams

NEWS IN BRIEF

● Did you know that in almost all cases you can leave out the *.* abbreviation, meaning 'all files here' in file operations? For example, the commands DEL \WP\LETTERS*.* and DEL \WP\LETTERS will both empty the LETTERS subdirectory of the WP subdirectory, and the second version is a lot easier to type.

● If you're looking for a near-laser quality printer for both PC and Archimedes/Master use, you would do well to consider the Hewlett Packard DeskJet 500. This is a revamp of the company's best-selling ink-jet printer, with extra internal fonts, waterproof ink (for the legal profession, in case you wonder) and a reduced price tag. The asking price is now £599 plus VAT, which should mean a street price of around £400.

● You can translate all kinds of graphic file to Archimedes sprite format using John Kortink's *Translator utility*, from most Archimedes Public Domain libraries.

The three formats of particular interest to PC users are IMG, produced by *GEM-Paint*, TIF, used by a lot of different graphics programs, and PCX, the ubiquitous format originated by *PC Paintbrush*.

Translating the other way is not nearly as easy, though. Does anyone know of a PC program which will read Archimedes graphic files?

● Try adding the following two lines to your CONFIG.SYS file, if they're not there already, or increase the values to the figures shown here:

```
FILES=20 BUFFERS=20
```

The extra space made available for disk I/O will mean slightly fewer accesses and slightly improved program throughput. These parameters are also essential for some applications to run.

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LETTERS



NICE ARC, NO ELITE

I have just purchased a brand new BBC A3000 and I consider it the best investment made for my home yet. Anyhow, I have a couple of questions. First of all, where is that brilliant space adventure *Elite*?

Written on the model B and upgraded for the Master 128 I would have thought it to have been one of the first games for the Arc. Can absolutely nothing be done?

If I had the money I would gladly pay whatever fees necessary to get this game off the ground as I am sure it would sell like hot cakes.

Another question. This may be just ignorance on my part but I cannot find details anywhere of the VIDC enhancer. I know that combined with a multi-frequency monitor it can do wonders for your screen display, but can it do anything for an ordinary monitor?

I have been enticed by the claims of this VIDC enhancer and would love to buy one, but I am not rich enough to splash out on a multi-frequency monitor. So will it be of any use to me?

Hugh O Byrne
County Kildare

***Elite* is not yet commercially available for the Archimedes. There are, however, rumours of a possible Arc version running under a modified 6502 emulator to be released by Arxe Systems. This can't be done until permission is given by Acorn and/or Firebird who own the rights to the game.**

As for a true Arc version and not just an emulation, well, the game itself took some time to develop on a 32K machine. Having 1Mb of memory available dramatically increases the scope of such an epic, and thus increases the amount of time to research, program and test it. Of course there are several projects in the pipeline that will use the full potential of the Arc, such as the almost legendary *Karma*, but still none have surfaced.

As the name implies, multi-frequency monitors are capable of varying their refresh rates, and they allow greater horizontal resolution than a standard monitor. The Atomwide VIDC enhancer, which includes a new video crystal on a small circuit board and the software to drive it, takes full advantage of this ability, allowing the Archimedes to display screen modes of up to 1148×448 pixels. But unless you have a multi-frequency monitor, it is useless.

PRAISE WORTHY

I am writing to tell you about the excellent service I got from Norwich Computer Services.

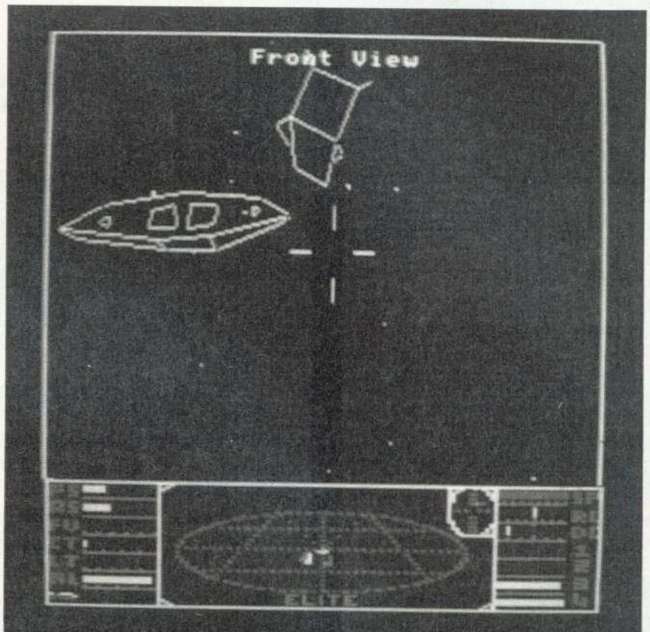
A short while ago I bought a hard disc from them for the school in which I work. I had also obtained some software which allowed me to partition my hard disc for use with my PC Emulator. I anticipated no problems, but...

To cut a long story short, without prior notice I visited NCS with the whole lot, including my A3000, in order to get things sorted out. A member of staff was about to leave, but he sat down and cheerfully corrected and completed the whole process. And this was *after* he had finished for the day.

This high-quality service should not go unmentioned and I hope therefore you will be able to print this letter.

Richard J Gates
Norwich

Praise where it's due is what we say. You may also be interested to know that Norwich Computer Services has now raised over £30,000 from its 'Careware' discs. The profit from such discs goes to different charities around the country. We too would like to say congratulations for a job well done. Keep it up, Norwich.



Where is Elite for the Arc?

CLUBBING TOGETHER

Your readers may be interested to know of the Club A3000. This club, officially launched at the Acorn User show, is now growing rapidly. It aims to provide Arc and A3000 users with contacts near them, and the ability to act as an agent for their area.

We are also beginning to hold open evenings around the London area although as more people join we hope to go further afield. Can I take this opportunity to ask anybody who owns an Arc and is interested in the club to write to the address below.

Club A3000
48 Michleham Down
Woodside Park
London
N12 7JN

FIRST STEPS

As someone who had decided to buy a BBC A3000 for Christmas, can I say how delighted I was to read your new series 'First Steps on the A3000' in last month's issue.

I have spent a great deal of time looking into my choice of new computer, having been a loyal Beeb owner for years. Your new series not only confirmed to me that the A3000 is exactly the right machine for me, but it has also helped me to convince the rest of my family that I wasn't wasting money on an expensive 'toy'. They all now seem as keen as I am to take those first steps!

Although I enjoy the technical side of computing, I have been attracted to the A3000 for its ease of use. Risc OS is superb, and I am looking forward to following the rest of the series and learning more. Keep up the good work!

John Dale
Birmingham

You can read the second part of our beginner's series on page 72. Like the first installment, it's been produced on the Arc itself – as has this page too.

SEND IN YOUR LETTERS

If you have a query, a question, an opinion or a gripe, then write in and tell us about it. We want to hear your views on anything in the Acorn world, be it Electron, Beeb, Master or Arc. Write to 'Letters' – the address is at the top of the page.

PROBLEMS A selection of problems from our Post A Problem service



QUESTIONS AND ANSWERS

Q I use ADFS on my BBC Master 128 Computer and, sadly, I have experienced problems with the dreadful E attribute. I have a copy of David Spencer's utility, which you published in the magazine, but I cannot understand how it works.

Paul Brooks
Yate

A To use the 'E' problem solver program you must know the sector address of the directory containing the E files. The directory address can be found by using the *EX or *INFO command.

Go to the parent directory above the one in question and type *EX or *INFO followed by the directory name. The hex address on the right-hand side of the screen is the sector address of the directory.

You then run the program and answer with the sector address. The program will set every file in the directory to WR – read and write.

Q I am very pleased with the Cobol compiler you published in the March 1990 issue of *BBC Acorn User*. I think that I am going to find it a very useful program in my industrial placement work.

However I have had trouble with the creation of source files for using with the program with *InterWord* and *View*. Can you offer some guidance?

Andrew Burgess
North Shields

A Source files for use with the Cobol compiler can be created on wordprocessors like *Wordwise Plus* which will produce pure Ascii text. You will have problems with *InterWord* as this produces header code before the text.

***View* can be made to produce pure Ascii text, but you will need to purchase the Ascii file spooler from Dabs Press which enables the wordprocessor to spool out Ascii text from *View*.**

Q I have a BBC micro and have recently purchased a second-hand Olivetti PR15 printer. It works very well with *Mini Office* but I am experiencing some difficulty in printing text produced with the *Folio* wordprocessor package designed by Tediman Software and published by ESM of Cambridge. I also cannot get the *Stylus* children's wordprocessor to print properly.

B Ewan
Harwood

A The *Folio* program uses an Epson FX-80 compatible printer graphics mode to obtain its high-quality printout. The fonts and styles it prints are not contained within the printer like those you are printing with *Mini Office*.

This I presume to be the same with the *Stylus* children's wordprocessor available from MAPE although a smaller number of styles are available. It would appear that your Olivetti PR15 is not compatible with the graphics mode that the programs are expecting and therefore the high quality printing is not available.

Your main hope would be to write to Tediman Software, PO Box 23 Southampton, Hants, SO9 7BD to see if they have produced a 'patch' for your printer for another user.

Its successful use with *Mini Office* would indicate it does have some Epson compatibility but only probably with the earlier Epson MX series.

If you are going to use *Folio* successfully with your BBC micro, you will find the Taxan/Kaga, Canon, Panasonic KX-P11081 and Citizen 120D very suitable.

New nine-pin printers of these makes can purchased for £120 upwards.

Q I've been really lucky in acquiring an Acorn 32016 Cambridge co-processor for use with my BBC model B micro. I wonder if you could point me in the direction of suppliers of software for this device?

Gary Hughes
Parkville
Australia

A Unfortunately no software was ever released for use with this 32-bit co-processor. It was supplied by Acorn with the PANOS operating system and bundled with some high-level languages.

It did prove popular in some UK academic institutions. I believe Queen Mary's College at London University had a network of the co-processors at one time.

Acorn quickly abandoned the system when they adopted the Arm concept for developing their 32-bit platform, the Archimedes.

Q I'm experiencing problems with the use of Watford Electronic's *Quest Paint* and *ConQuest* products. The former works all right if *ConQuest* has

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The Post A Problem service guarantees to give you a personal answer within 10 working days for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

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Date out:
Answered by:

not been installed. I have a BBC B which has an Aries Shadow Ram (B32) and sideways Rom board (B12) installed. I use the Acorn DFS and the Watford DFS v1.42.

James Hulin
Bristol

A ***ConQuest*** **makes use of banks of sideways Ram to enable it to operate fully.**

The compatibility section of the *ConQuest* manual indicates that on the BBC B Plus 128 and the Master 128 this is 'simply achieved by selecting the appropriate bank with the Rom select register at &FE30'.

The Aries B32 board is modelled on the way the memory is managed in the BBC B Plus, but that is for the version without the sideways Ram extension boards that Acorn released later. This is the start of your problem.

The Aries B20 provides 20K of Shadow Ram and 12K of sideways Ram. In addition, the controlling software for the Aries board enables you to configure the 32K of Ram in the B32 so that you can have a full 16K of Sideways Ram. The problem is to get *ConQuest* to recognise this sideways Ram.

Watford supplies a user definable sideways Ram driver for incompatible sideways Ram systems. Watford Electronics, as the sole supplier of Aries products, should be able to help you.

Q I've purchased a second hand EMR MIDI 4 interface podule for an Archimedes, which I want to program for specialist applications with my own Basic and assembler code. But as there was no software and no manual I don't know where to start.

Mr T Wills
Wrexham

A **The MIDI Interface you have normally installs a module when supplied by EMR. You will therefore need the driver module for EMR MIDI hardware, the WFS (Wave Filing System). This is definitely supplied with the EMR sound sampler package which includes the MIDI podule you have.**

It will be considerably easier to use the EMR MIDI podule if you can obtain the module. I suggest that you contact Mr Beecher at EMR. He may also be able to offer advice on programming these sort of specialist applications.

Q I have a BBC A3000, but I don't want to do any impressive document processing or desk top publishing. I just want to do simple wordprocessing like I did on the Beeb with *Wordwise Plus*. What 'real' wordprocessors are available?

Mr C Pattern
Wareham

A **Old BBC wordprocessors like *Wordwise Plus*, *Interword* and *View* are available for the A3000. They usually work under the 6502 emulator, although there is a new native mode version of *Wordwise Plus*.**

First Word Plus **seems to be the most popular wordprocessor specifically released for the A3000. *PipeDream* from Colton Software is also a good, coming from the same stable as *View* on the BBC.**

Q I have heard that the BBC A3000 has a number of international keyboard layouts. I would like to use this facility. How do I carry out the switching?

Ian Graham
Leeds

A **The 'swapping' feature is offered by the international keyboard module, and it is possible to switch between any of the available keyboard layouts with a series of key presses. For example by pressing ALT/CTRL/F1 you can select the UK keyboard layout, while ALT/CTRL/F2 will revert to the correct layout for the configured country.**

You can also select the keyboard for a country by pressing ALT/CTRL/F12 and then, without releasing the ALT key, typing the international dialling code for the country on the numeric keypad.

ACORN CUSTOMER HOTLINE

Acorn has released a new set of the four printer drivers, !PrinterPS (v.2.44), !PrinterLJ (v.2.44), !PrinterDM (v.2.46) and !PrinterIx (v.2.46). Below are detailed some of the changes that have been made to this release of the drivers:

Release 2 of Acorn's printer drivers are enhanced versions of the original release, so they should be used in a similar manner to the original versions. Printing files graphically (for example, from *!Draw* and *!DTP*) occurs in the same way as under the original release of the printer drivers. Release 2 of the printer drivers mainly improves the text printing facilities, because it provides a special 'fancy' text file format which allows underlining, subscript, superscript, bold, light and so on. The printer driver also lets you put a title on each page and/or number the lines, when printing 'fancy' text. As standard a simple text file as this one comes out as 'fancy' text, but the special features are turned off and so you get the same output as under the original printer drivers.

There is a new printer driver option in addition to Serial, Parallel, Econet and File. This is for NFS printing, for use with the TCP/IP suite available from Acorn. For more details, read your TCP/IP manual.

The drivers now support multiple file printing. Printing can be paused and aborted from the driver. *1st Word Plus* files can be printed as 'fancy' text without having to load *1st Word Plus*.

The new drivers can be obtained from SID or from your local Acorn dealer who has access to SID. Your dealer may levy a small charge for downloading the drivers. Please do not write to Acorn requesting the drivers as we are unable to supply them directly. The number of bulletin boards supporting the Archimedes is now comfortably into double figures.

While that may not sound many, for a long time there were just four!

I may be biased, but I think that SID is still the one to call.

- It is *the* forum for technical discussions about the BBC, Archimedes and RISCiX workstations. Unlike any other online system we have access to the minds behind Risc OS !
- It is the only place where you can download new versions of Acorn products, such as the new *65Host* or *ChangeFSI* (though you can get them by post for £19.55 – see *BBC Acorn User* January 1991 for more details).
- It is accessible by direct dial for guest users, and via Prestel and Fastrak for registered users.
- A massive collection of software to download; 80Mb and growing rapidly.

SID is a viewdata system, requiring a parity setting of 7E1 (seven data bits, Even parity, and one stop bit). Dial our guest access on (0223) 243642 and have a look around!

Alternatively, you can write to the SID Editor at Acorn Computers Ltd, Fulbourn Road, Cherry Hinton, Cambridge, CB1 4JN for more details.

We are once again getting a large number of enquiries regarding configuration problems with various machines. We find that in the vast majority of these cases that the batteries which keep the CMOS powered while the computer is off are completely flat. The batteries should be changed every 12 months to be totally safe.

Replacement battery units for the Master 128 cost £4.60 from any Acorn dealer. The fitting of the replacement battery unit is extremely easy and can be performed by experienced users. The Acorn product code for this item is ADT16.

The Archimedes range requires two leak-proof, size AA replacement batteries. The A3000 has a rechargeable battery and so does not need replacing.

RETAIL PRICE LIST

Ian Copestake Software

ACU9, 10 Frost drive, WIRRAL, Merseyside, England, L61 4XL
Tel / Fax: 051-648 6287 International: + 44 51 648 6287

VAT UK customers please add 15% to the total price, except for the zero-rated items which are marked VO.

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Goods are guaranteed but we do not supply them on approval.

BBC / MASTER / ELECTRON SOFTWARE

BET Basic Editor and Toolkit		
– rom module	ICS	£19
– rom in cartridge	ICS	£25
Powerfont NTQ	ICS	£13
Power Fonts	ICS	
– see last column		
Spellmaster rom	CC	£52
Wordpower	ICS	£36
– site licence (extra)		£100
– extra rom		£7
– extra manual		VO£7

ARCHIMEDES SOFTWARE

If it's not on the list, ask for a quote. We'll try to match the best prices.

Accounts	Min	£243
Alpha-Base	Cla	£38
Archway	Sim	£74
ARC-PCB	Sil	£139
– Professional	Sil	£277
Armadeus	Cla	£61
Artisan II	Cla	£44
Artisan Gallery	Cla	£16
Atelier	Min	£67
Autosketch CAD	Aut	£69
Basic Compiler	Dab	£75
Buffer Module	Cla	£20
Craftshop 1	4ma	£29
– network version		£34
Craftshop 2	4ma	£29
– network version		£34
DataVision	Sil	£113
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Desktop Enhancer	Mit	£26
Desktop Office	Min	£97
Desktop Publisher	Aco	£110
Disc Tree	Mit	£37
DFS Reader	Bee	£9
DrawBender	ICS	£10
– DrawBender + Fonts		£12
– site licence		£50
Easiword	Min	£31
Equasor	CC	£49
Euclid II	Ace	£52
Film-Maker	Sil	£75
Financial Accountant	Sil	£206
First Fonts	ICS	
– see last column		
FlexiFile	Min	£113
Flying Start II	Mit	£88
FontFX	Dat	£9
– site licence (total)		£60
Font Pack	Aco	
– Newhall		£41
– Starter		£41
– Symbol		£41
Font Pack	Bee	
– 1 (already included with Ovation): Paladin, Swiss B, SymbolB, Vogue		£43
– 2: Bookman, Chancery, Courier, Garamond		£POA
– 3: Dingbats, New Century Schoolbook, Optima, Times		£POA
Font Pack	CC	
– Avant Garde		£29
– Bookman		£29
– Pembroke		£29
Fourier Analysis	Arm	£60
Gammaplot	Min	£52
Gate Array Design/Teaching	Sil	£113
Genesis	Sof	£74
– education price		£65
GerberPlot	Sil	£92
Graphic Writer	Cla	£23
HardBack	Cir	£25
Hard Disc Companion	Bee	£35
Hearsay	Bee	£51
Hotlink Presenter	Lin	£43
Impression Junior	CC	£74
Impression 2	CC	£135
Inspiration	Pand	£POA
Interchart Rom	CC	£25
Interdictor	Cla	£30
Intersheet Rom	CC	£39
Interword Rom	CC	£39
Investigator	Ser	£22
ISO C Devt System	Bee	£77
Jiglet	4ma	£26
Jigsaw	4ma	£28
Knowledge Organiser	Cla	£47
LC-10 Colour driver	Ace	£13
Logo	Lon	£55
MisMatch	ICS	£10
MultiFS	Arx	£27
Multistore	Min	£197
– site licence (total, 30 computers)		£1250
Numerator	Lon	£69
Office Tools	Sil	£278
Ovation	Bee	£79
Ovation Demo (refundable on purchase)	Bee	£5
Payroll	Min	£129
Pendown (full release version)	Lon	£49
Personal Accounts (vn 2)	Apr	£23
PipeDream 3	Col	£112
PipeDrivers	ICS	
– see last column		
Poster	4ma	£79
Power Fonts	ICS	
– see last column		
Premier	Cir	£71
– DataBase	Cir	£25
– WordProc	Cir	£25
Presentation System	Sil	£61
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Presenter II	Lin	£36
Pro Artisan	Cla	£74
Professional PDT CAD	Oak	£353
Protext	Arn	£117
Realtime Solids Modeller	Sil	£139
Render Bender	Cla	£58
Rhapsody	Cla	£35
RiscBASIC Compiler	Sil	£113
RiscForth Compiler	Sil	£113
RISC OS Companion Vol1	Sof	£49
RoboLogo	Sil	£75
Schema	Cla	£96
School Administrator	Min	£69
Score PMS	Emr	£499
ShareHolder	Sil	£139
Sigma Sheet	Min	£53
Snippet	4ma	£26
SolidCAD	Sil	£113
SolidsRender	Sil	£113
SolidTools	Sil	£279
Squirrel (delivery January)	Dig	£109
– Econet version		£459
– site licence		£475
Studio 24 Plus	Emr	£POA
Super-Dump	Sil	£25
Super-Plot	Sil	£32
System Delta Plus II	Min	£54
Tempest	Cla	£97
Timewatch	Mit	£26
Toolkit Plus	Cla	£37
TWO (Task and Window Organiser)	ICS	£19
– site licence		£60
Utility Disc 1	Dat	£13
View	Aco	£47
VewSheet	Aco	£47
ViewSpell	Aco	£34
ViewStore	Aco	£52
Wordpower Arc	ICS	£36
– site licence (extra)		£100
1st Word Plus	Aco	£64

FACSIMILE MACHINE

FO-2100 (full-feature, Mercury-compatible)	Sha	£799
– 12-month warranty		£59

PRINTERS

ArcLaser	Cal	£904
Bubble Jet BJ-10e	Can	£277
– Sheet feeder		£54
Bubble Jet BJ-130E	Can	£479
GQ-5000 (12-month on-site maintenance)	Eps	£879
KX-P1124	Pana	£226
– 32k ram for above		£20
KX-P1624	Pana	£369
KX-P4420 8ppm	Pana	£792
KX-P4450i	Pana	£1275
– 1Mbyte upgrade		£299
Laser Direct	CC	£856
Laser Direct LBP4 Card	CC	£360
Laser Direct LBP8 600 including toner	CC	£1287
LC24-10 32k ram card	Sta	£61
Swift 24 Colour	Cit	£270
Archimedes parallel printer cable		£8

MONITOR

Multivision 795	Tax	£492

SCANNERS

i-Scan	Irl	£587
Scan-Light A4	CC	£379
– Sheet feeder		£POA
Scan-Light Junior	CC	£178
– A3000 version		£175

UPGRADES

A3000 2Mb	Ato	£68
A3000 2Mb	Ife	£68
A3000 4Mb	Ife	£243
A310 2Mb	Ato	£345
A310 4Mb	Ato	£499
8Mb A400/1 / A440 / R140	Ato	£699
ARM3	Ale	£400

FUNCTION KEY STRIP ORGANISER

Arckey	ICS	VO£3
– quantity of 4		VO£10

KEYBOARD COVERS

Seal 'n Type (spill-proof)		
– Archimedes	Kad	£14
– A3000	Kad	£14

ICS FONTS

1st Word Plus **First Fonts**
PipeDream **PipeDrivers**
Wordpower **Power Fonts**

Please tell us which of the above you need and specify your printer make and model. A more detailed list of fonts is available.

Site licence £50
For multiple use of First Fonts or PipeDrivers. (Power Fonts are covered by a Wordpower site licence).

Symbol sets
e.g. Chemistry, Czech, ICS1 (Forms Design), ICS2 (IBM characters), Latin 1 (includes French, German, Italian, Spanish), Latin 2, Latin 3 (includes Esperanto), Latin 4, Mathematics & Physics, Russian
– for dot matrix £19
– for laser £29

24-pin & HP laser typefaces
Bodmin, Neston, Old English, Personal, Royden, Shadow and Initials, Universal 8pt, Universal 10pt, Universal 12pt, Weimar Fraktur
– 24-pin: any 3 faces £29
– laser: any 3 weights £29

Star LC-10 typefaces
Black, Caldy, Outline, Pensby, Raby, Shadow, Universal
– any 4 £19
– all 7 £29

PipeDriver Dot 1 £10

Powerfont NTQ £13
Provides near letter quality on ordinary 9-pin printers. Required for some Power Fonts.

KEY TO MAKERS

Ace	Ace	Cla	Clares	Mit	Mitre
Aco	Acorn	Col	Colton	Min	Minerva
Ale	Aleph One	CW	Computerware	Oak	Oak
Apr	Apricote	Dab	Dabs	Pana	Panasonic
Arm	Armadillo	Dat	Data Store	Pand	Pandora
Arn	Arnor	Dig	Digital Services	Ser	Serial Port
Arx	Arxe	Emr	EMR	Sha	Sharp
Aut	Autodesk	Eps	Epson	Sil	Silicon Vision
Bee	Beebug	ICS	Ian Copestake	Sim	Simtron
Cal	Calligraph	Ife	IFEL	Sof	Software Solutions
Can	Canon	Irl	Irlam		
CC	Computer Concepts	Kad	Kador	Sta	Star
		Lin	Lingenuity	Tax	Taxan
Cir	Circle	Lon	Longman Logotron	Tec	TechSoft
Cit	Citizen			4ma	4Mation

In the News

DrawBender

DRAWBENDER will make Draw files follow a shape of your choice. A useful addition or cheap alternative to Poster, available with or without a set of three decorative fonts. The example above was made using DrawBender with FontFX.

We will send a £25 voucher to the purchaser who thinks of the best new name for it!

EQUASOR



Order now if you want to be one of the first to use this equation building application, with its own mathematical, Greek and other symbols.

WORDPOWER

Still the best for the Electron, Master and BBC.

"I have yet to find a word-processor that gets close to it for usability and quality of output" said BEEBUG recently.

SCHEMA IN STOCK!

RISC User decided that this spreadsheet "has to be the first, if not the only choice". We now have the full (very stylish) package in stock at £96, complete with manual.

SQUIRREL

You would be nuts not to order this new database from Digital Services at our special offer price of £109! Delivery will be in January.

BASIC Editor and Toolkit

BET

BBC, Master and Electron users will find BET makes the creation and editing of BASIC programs a real pleasure and encourages the development of a good programming style (Archimedes owners will envy its facilities). Full details on request.

CITIZEN SWIFT 24

For a limited period we are offering the colour version of this printer for only £270!

MISMATCH

A delightful new version of the Pelmanism memory game for all age groups. Excellent graphics and (controllable) sound. An ideal introduction to the Archimedes for five-year-olds. Grown-ups will find it addictive but good for the mind!

PIPEDRIVERS

If your dot matrix printer has more features than PipeDream knows what to do with, you need Pipe-Driver Dot 1. It provides access to resident and download fonts, ink colours, variable print size and line spacing etc.

Like our **First Fonts** for 1st Word Plus and **Power Fonts** for Wordpower, PipeDrivers can make foreign language and scientific word-processing a pleasure. And our 24-pin and LC-10 typefaces will brighten your output at full printer speed.

ARCKEY

With more applications on the market a function key strip organiser is indispensable. Arckey users do it without glue! Suitable for BBC and Master too.

POSTER

Use it on its own or with any DTP program to produce endless special effects at any size. Our price includes a site licence, a range of clip art and borders, and 20 fonts which can also be used with other programs.

TASK AND WINDOW ORGANISER

TWO can group a number of tasks together and start them up with one double-click on the mouse. Applications can be run, files loaded, directories opened, and star commands executed.

Up to 42 task groups may be defined very easily and listed on the screen when the computer starts up. A great help when inexperienced users need access to the system, and a welcome time-saver for old hats.

TWO will instantly re-arrange windows in rotating stacks, piles or a space of their own. No more hunting for the missing one! TWO will also save configuration settings, set Copy and Wipe options, or blank the screen after a specified period of inactivity.

New from Ian Copestake Software £19 + VAT Sites £60

Getting the ideA

At last there is a high-quality range of hard disc upgrades at affordable prices. The *ideA* range from ICS.

For those who haven't heard, the *ideA* is a brand new hard disc interface for Archimedes and A3000 computers. 'IDE' stands for Integrated Drive Electronics. As the name suggests IDE hard discs have sophisticated electronics built into them, allowing the computer interface to be simpler, cheaper and more reliable. Transfer and access speeds can also be enhanced.

Most IDE discs are auto-parking, and some have the ability to switch themselves off to save power during periods of inactivity.

Now for the first time we can offer Archimedes users products previously available only in the PC world.

Although the *ideA* is new, you can use it just like the familiar ADFS. All properly written software will work as usual and there is no conflict of *ideA*s with existing ADFS or SCSI drives.

Fitting a hard disc in an A300/400 series computer is straightforward and clear instructions are provided. All discs supplied by us are tested and formatted. The complete upgrade kit includes a disc cradle and fan, and is called for example **IDEARCIN40**. The 40 at the end indicates the hard disc capacity: our Price List shows the sizes currently available (others will be added soon).

A backplane is not needed on the A310 unless you wish to connect other podules. In that case you must use a high-quality four-layer backplane such as the one we offer.

One of the most exciting products in the *ideA* range is a fully internal hard disc upgrade for the BBC A3000. This is ideal for schools or any location where space is at a premium or where security and portability are important. The **IDEA3IN20** uses one of the latest 2½" 20 megabyte low-power discs. We cannot be sure yet whether larger capacities will become available for internal fitting.

INTERNAL A3000 HARD DISC

Although installing the A3000 upgrade is quite easy, it could be dangerous for inexperienced users to open the computer. We have therefore priced this particular product to include collection and fitting at our service centre. (Please make sure we have your daytime and evening telephone number so we can arrange this). Deduct £10 if you do not require the A3000 fitting service.

Ian Copestake Software will be producing a range of other accessories for the A3000. First to arrive is **IC PLINTH**, a steel monitor stand to which you can later add **IC HOUSE**, our hard and floppy disc drive housing (ready soon). The Plinth can take a variety of 14" monitors yet occupies less than 18" from front to back when in use. It has anti-slip feet and may be fixed to a desk. Assembly is easy. There is full access to the mains switch and floppy disc drive, while the reset switch is accessible but guarded.

The *ideA* hard disc controller is also available on its own for those who are confident of choosing a suitable IDE hard disc themselves. The product reference is **IDEARC**. We must point out that we can only accept responsibility for the performance of the *ideA* interface with discs we have tested.

INTRODUCTORY PRICES

(guaranteed until 31st December)

IC HOUSE			T.B.A.
IC PLINTH			£21
IDEA3IN20	23ms*	incl fitting	£499
IDEARC			£110
IDEARCIN40	28ms*		£349
IDEARCIN80	19ms*		£499
IDEARCIN135	28ms*		£699
IDEARCIN200	15ms*		£899
IFEL 4-slot 4-layer Backplane			£57

*Average access times, subject to constant improvement

Ask about our special evaluation offer for LEAs and authorised Acorn dealers

051-648 6287

Ian Copestake Software

For all Archimedes and A3000 owners, **DAVE ACTON** has compiled hi

RISC REVUE

£15 ALL OF A DITHER

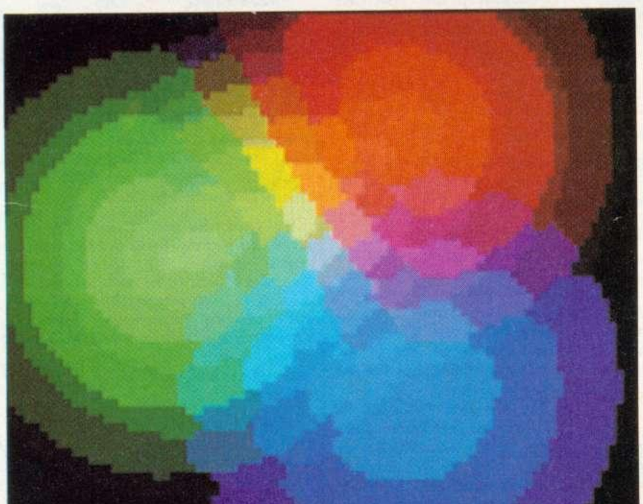
On the good old Beeb, things were simple. There were at most just eight colours to choose from. When the Arc came along, the possibilities were greatly increased. Colours in the 16-colour modes on the Archimedes are not restricted to a fixed palette – you can have any 16 you choose from a range of 4096. Furthermore, 256-colour modes were also a feature of the new machine.

The Desktop added its own complications. Because the Desktop environment is designed to work in any screen mode (including those that haven't been invented) it was decided that the Desktop palette should consist of 16 colours chosen from the 4096 the Arc can produce, and that conversions should be made depending on the current mode.

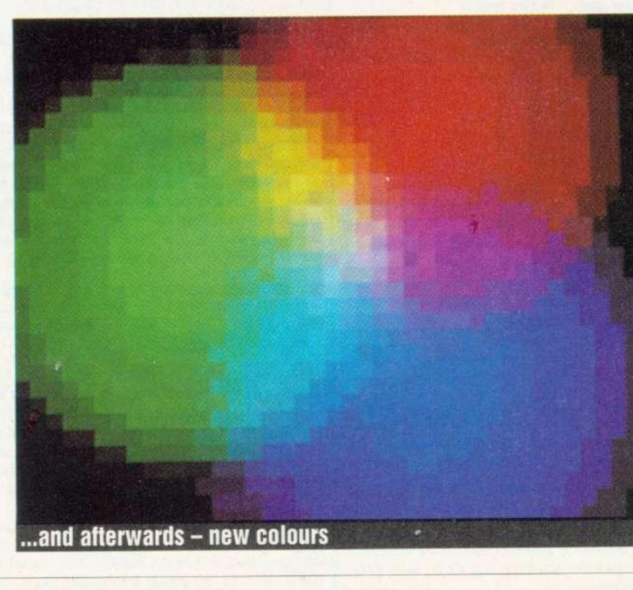
For example, colour 11 of the Wimp palette is bright red. In mode 12 and other 16-colour modes, the palette is changed so it accurately resembles the 'imaginary' palette of the Wimp. In 256 colour modes such as mode 13, the nearest red of the 256 default colours is chosen to resemble Wimp colour 11. The shade of red may not be quite as required, but is the best available.

In four-colour modes the best approximation to the Wimp palette is found in the same way but with only four colours to choose from, the best that can be managed is to set them to four grey-scales. Finally, in two-colour modes the process known as 'dithering' (mixing two colours together in a pattern) is employed to give the appearance of there being more than just black and white to choose from. This doesn't work too well, but you shouldn't really use the desktop in mode 0.

Finding the best available colour becomes more complicated when you consider plotting sprites. To add to matters, a module was developed called ColourTrans to fill the gap between what colours were needed and what colours were available. You'll find a copy of ColourTrans on your applications discs. Listing 1 shows how to use one of the simplest ColourTrans calls.



Before dithering...



...and afterwards – new colours

Two colours are randomly chosen. These are 24-bit colours, eight bits each for the red, green and blue components. Then, ColourTrans_SetGCOL is called to choose the best available colour for various stages between the two start colours. Rectangles are plotted to form a scale from one colour to the other. The call ColourTrans_SetGCOL takes a single parameter – a 24-bit colour of the form &BBGGRR00 which contains the red, green and blue components of the colour to be approximated. When done, press a key and two new colours will be picked. You will see that some scales turn out much better than others. Because only 256 of the 4096 possible colours are available in mode 13, there are 'holes' in the palette and you'll see quite large jumps in the scale.

But how does ColourTrans know which colour is nearest? The process used is actually quite simple and revolves around the principle of 'least squares'. Imagine two colours with red green and blue components (r1,g1,b1) and (r2,g2,b2) respectively. The 'distance' between the two colours might be thought of as:

```
dist=(r1-r2)^2+(g1-g2)^2
+(b1-b2)^2
```

in much the same way as the distance between two points in 3D space is found. However, the human eye responds differently to the three component colours and so to find the true 'distance' we must weight the individual parts. ColourTrans uses weights of 1,2 and 3 for the blue, red and green parts respectively. More accurate figures to use are 0.10, 0.39 and 0.51, although the limitations of the Archimedes hardware enable ColourTrans to be right enough. So, our equation becomes:

```
dist=0.39 * (r1-r2) ^2
+0.51 * (g1-g2) ^2
+0.10 * (b1-b2) ^2
```

Listing 2 illustrates the idea of finding the closest colour using

the formula above. Three centres are chosen for the three basic colours red, green and blue. Then a patchwork of squares is plotted. The colour of each square is determined from its distance from each of the centres. Having found the 24-bit value of a square's colour, the nearest approximation in mode 13 is found by FNclosest.

Note that the colour found by FNclosest is an 'internal colour number'. In order to use the number in a GCOL it must first be converted into a GCOL number. This requires the bit-shuffling performed by FNcolournumtogcol. The internal number of a colour is the form used by the hardware and by calls such as OS_ReadPalette which is the reason for the conversion in listing 2.

A further problem arises when selecting a colour with GCOL in a 256 colour mode. On the Beeb, GCOL 0,129 didn't choose colour 129 but instead set the background colour to 1. For this reason, the extra keyword TINT is provided on the Arc. Two of the bits of a colour are taken off and these are appended to a GCOL after the TINT. You can see the shuffling needed in PROCgcol.

Returning to the Beeb and Master, to get around the limited palette 'dithering' was used. Orange could be produced by using a chessboard arrangement of red and yellow pixels. The ECF (extended colour fill) was invented for this purpose and it is still available on the Arc using VDU 23 with various parameters. The Wimp uses these when trying to produce different greys in mode 0 and the command Wimp_SetColour automatically chooses an ECF if the current mode is a two-colour one and the colour selected is in the range zero to seven.

However, the ECF patterns are little use in 256 colour modes. I thought it might be nice to try dithering in these modes since the number of possible colour combinations is considerable (256*256 in fact). Listing 3 represents a 'brute force' approach to the problem.

The idea is a simple extension of listing 2. To find a particular colour, all 65,536 combinations of colours are considered. Each pair of colours is averaged (the red, green and blue parts are added together and the totals divided by two) and the closest average colour is found. Sometimes both components will be the same colour. They may be quite different however. To get the colour &80808000 we could mix &40404000 with &C0C0C000 or &70707000 with &90909000.

There are two main loops, one inside the other. The registers count and count2 contain the colour pair currently being examined. To minimise the calculations performed within the central loop, lookup tables are first constructed. There is one each for red, green and blue and they contain values of weight*(x*x) for values of x from 0 to 255. Comparing the outputs of listings 2 and 3 shows how effective dithering can be in producing subtle differences in colour.

REVIVING MODULES

Less well-behaved applications and, particularly, games sometimes unplug some of the relocatable modules in the Arc in order to release extra memory for them to use. Individual modules can be reinstated using the command *RMReinit and the command *Unplug with no parameters will provide a list of those modules to have been zapped. However, an easier solution is to use listing 4 courtesy of Nick Furness and Mark Stedman of The Perse School.

The call they use to investigate the state of modules is OS_Module. With R0=19, this call 'enumerates' Rom modules taking in R1 a module number and in R2 a value indicating which 'area' to examine. R2=-1 means look in the Rom, R2=0 to 3 means look in the appropriate expansion card.

On exit, the call returns a pointer to the module name in R3 and in R4 a number indicating the status of the module. This can be -1 (unplugged), 0 (inserted but dormant), 1 (active) or 2 (running).

Any unplugged modules are reinstalled and a counter is kept of how many have been brought back to life.

STARRY EYED

A little graphic number here from *BAU* regular Dave Lawrence. Listing 5 on the yellow pages displays and animates a set of stars to give the appearance of movement through space.

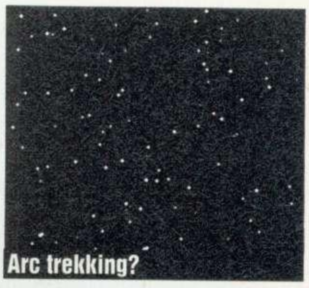
It is, as you might expect, written in machine-code. The stars are plotted directly on a mode 13 (256-colour) screen for speed and simplicity. Each star is stored in 16 bytes and the stars are initialised with randomly chosen values in PROCstars. The first word contains the x co-ordinate and the second the y. The x co-ordinate is shifted left 16 so that small velocities can be dealt with without the need for floating-point arithmetic. The next word contains the velocity and the final word is used to store the previous position of the star so it can be deleted correctly.

The main loop consists of loading a star's data into registers, deleting the old image, moving the star on (replacing at the right edge if it has gone off the left) and replotting it. To enhance the depth effect, more distant stars are plotted in darker colours. Each star's velocity is used to determined which colour is chosen from the table at .colours.

You can alter the number of stars plotted by changing the value of the variable stars. You might also like to try different velocities. To halve the speeds change the <<15 to <<14 at line 200. You will also need to change LSR #15 to LSR #14 at line 560 so that the correct colours are used.

£10 EDIT CURE

Now that so many outline fonts are available, a bug in *!Edit* has come to light, namely that any more than about 30 fonts will cause it to crash. A solution comes from Graham Allan of St Andrews who points out that


Arc trekking?

!Edit only checks what fonts are available at startup. Graham's solution is to fool the program at startup into thinking there are no fonts by temporarily changing Font$Path - the system variable that points to the !Fonts directory. Once installed, Font$Path can be reset to its old value.

First, ensure you have a backup copy of *!Edit* before you start making the changes. Next, rename the !Run file as !Run2. It's a good idea to load *!Edit* before you do this because you'll need it to create a new !Run file. This should be an Obey file and it goes like this:

```
wimpslot 8k 8k
set Edit$Temp <Font$Path>
set Font$Path <Obey$Dir>.
run <Obey$Dir>.
!StartEdit %*0
set Font$Path <Edit$Temp>
unset Edit$Temp
```

Finally, type in the short Basic program in listing 6 and save this along with the new !Run file as !StartEdit in the Edit directory.

The solution works by redirecting Font$Path somewhere silly and then starts *!Edit* by calling !Run2 as a sub-task. The call Wimp_StartTask is used to create one task within another. The call OS_GetEnv is used to pass on to !Run2 any parameters (for example, the filename of an Edit file you've double-clicked).

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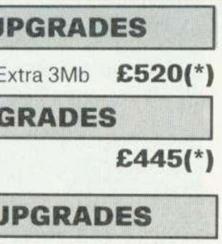
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TERMS: UK residents add 15% VAT to all prices, except books. Delivery FREE on all postal items in the UK. Export, no VAT, carriage at cost. (quotations available). Europe maximum £2.50 software, £35 hardware. Access/Visa cards accepted by post/phone/in person. We are authorised Acorn dealers. Official orders accepted from public sector/education/PLCs, otherwise cash with order. Tender invitations welcome. Callers welcome. We are about 800 yds north of J17, M62. Fax: 061-766 8425. Price subject to change without notification. Goods offered subject to being unsold.

Dabhand Computing Ltd, 5 Victoria Lane, Whitefield, Manchester M25 6AL. This advert was produced using Impression from Computer Concepts.

Archimedes Computers

A 3000 2Mb Ram	**£599**
A 3000 LC 2Mb Ram *	**£699**
A 410/1	**£1099**
A 420/1 LC **	**£1299**
A 440/1	**£1699**
A 540	**£2995**

We can match or improve on prices advertised or quoted in or from this magazine please phone for the best deals.

We operate the Acorn Schools, University, teachers schemes.

* Pack includes PC Emulator, 1st Word Plus, Genesis. ** + Acorn DTP.

Oak SCSI Devices

20 Mb Internal Hard Disc	£345
45 Mb Internal Hard Disc	£449
80 Mb Internal Hard Disc	£592
100 Mb Internal Hard Disc	£783
200 Mb Internal Hard Disc	£1125
20 Mb External Hard Disc	£485
45 Mb External Hard Disc	£565
80 Mb External Hard Disc	£727
100 Mb External Hard Disc	£919
200 Mb External Hard Disc	£1235
300 Mb External Hard Disc	£2010
512 Mb External Hard Disc	£2535
560 Mb Magneto Optical Drive	£3220
42 Mb Ext. Removable Hard Disc	£999
60 Mb Tape Streamer	£860
Tape for above	£22
150 Mb Tape Streamer	£1249
Tape for above	£25
1 Gb Tape Drive	£2535
Tape for above	£30
for additional devices deduct	£100

Archimedes A400

5.25" Ext. floppy disc interface	£30
A 540 4Mb Ram Upgrade	£449
Additional 3.5" Floppy Disc	£119
ARM 3 Upgrade (30 MHZ)	£449
ArVis S-VHS Video Cont. Board	£295
ArVis S-VHS Encoder Board	£145
ArVis Video Graphics Board	£877
Atomwide 8 Mb Memory Upgrade	£850
Chroma 345 Overlay Board	£389
Dongle Dangle (Impression/Oak)	£6
Econet Module	£46
Ethernet Expansion Card	£249
Floating Point Expansion Card	£449
Hawk V9 Video Digitiser	£339
I/O Expansion Card	£79
Keyboard Extender	£8
Midi Upgrade to I/O Exp. Card	£27
Midi Expansion Card	£65
Midi Upgrade Rom	£14
Mouse (New Style)	£40
Scanlight Junior Scanner A6 (CC)	£179
Scanlight Senior Scanner A4 (CC)	£389
Sheet Feeder for above A4 (CC)	£95
SCSI Expansion Card (Acorn)	£229
TCP/IP Ethernet	£199
VIDC Enhancer	£29

Dabhand 400 Series Expansion Options

Dabhand 410/1 to 420/1

Acorn A410/1 upgraded to A420/1 specification using only the highest quality Samsung Ram and Oak's "Zero Defect" 20 Mb Seagate ST 125-1 28ms drive formatted and tested for guaranteed trouble free use.

A410/2 20 Mb	**£1099**
Colour System	**£1289**
Eizo 9060 SZ System	**£1542**

Dabhand 410/1 to 440/1

Acorn A410/1 upgraded to A440/1 specification using Oak's 40 Mb 28ms drive formatted and tested as above.

A440/1 specification	**£1299**
Colour System	**£1488**
Eizo 9060 SZ System	**£1742**
Taxan 795 System	**£1799**

Oak 410/1 ST506 Hard Disc Drives

Archimedes A410 Internal Hard Disc Drives for use with 'on-board' ST506 winchester controller. Comes complete with mounting chassis, screws, connecting cables and easy to follow fitting instructions.

20 Mb 28ms	**£169**
40 Mb 28ms	**£285**
47 Mb 24ms	**£345**

A400 Series Ram Upgrades

Fast Samsung Ram complete with step by step fitting instructions.

1 Mb Ram	**£50**
2 Mb Ram	**£95**
3 Mb Ram	**£140**

A410/1 Series Ram and Oak Drive Upgrades

Up to 2 Mb Ram + 20 Mb	**£215**
Up to 2 Mb Ram + 40 Mb	**£330**
Up to 2 Mb Ram + 47 Mb	**£390**
Up to 4 Mb Ram + 20 Mb	**£305**
Up to 4 Mb Ram + 40 Mb	**£420**
Up to 4 Mb Ram + 47 Mb	**£480**

Dabhand Art/CDT Pack

Acorn A410/1 upgraded to A420/1 specification complete with:-

Pro Artisan
WorraCAD
RISC OS Extras & Utils Discs
Box of discs, printer cable and mouse mat

A410/2 Art/CDT Pack	**£1219**
Colour System	**£1408**
Eizo 9060 SZ System	**£1662**

Dabhand DTP Pack

Acorn A410/1 upgraded to A420/1 specification complete with:-

Impression & Scanlight Junior
Pro Artisan
RISC OS Extras & Utils Discs
Font FX, Box of discs, printer cable and mouse mat

A410/2 DTP Pack	**£1439**
Colour System	**£1628**
Eizo 9060 SZ System	**£1882**

Dabhand Business Pack

Acorn A410/1 upgraded to A420/1 specification complete with:-

Impression & Scanlight Junior
Pipedream
RISC OS Extras & Utils Discs
Font FX, Box of discs, printer cable and mouse mat

A410/2 DTP Pack	**£1469**
Colour System	**£1658**
Eizo 9060 SZ System	**£1928**

Additional upgrades for Dabhand Packs

Up to 4 Mb Ram	**£95**
Up to 40 Mb Hard Disc	**£116**
Up to 47 Mb Hard Disc	**£176**
Up to 4 Mb Ram + 40 Mb	**£236**
Up to 4 Mb Ram + 47 Mb	**£296**

Please add these prices to the base system prices quoted above.

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
(A member of the Jessa group of Companies – Established 1972)
Tel: Watford (0923) 37774 Tlx: 8956095 Fax: (0923) 33642

Acorn — The choice of Experience

The sign of Quality

Shop Hours: 9am to 6pm (Mon.-Sat.) Thursday 9am to 8pm. FREE customer car park.
All prices exclusive of VAT; subject to change without notice & available on request.

Archimedes micro

System	Basic	Mono	Colour	Multiscan
410/1	£1099	£1159	£1288	£1448
420/1	£1299	£1359	£1488	£1648
440/1	£1699	£1759	£1888	£2048
540/1	£2995	£3065	£3184	–

Archimedes A3000

12 MONTHS FREE MAINTENANCE ON SITE

- A3000 Microcomputer £599
- A3000 + Learning Curve pack £699
- 3.5" External Drive £99
- Monitor Stand £16
- External Podule Case £13
- Serial Upgrade £17
- A3000 Technical Manual £29
- Dust Cover Micro only £5
- Dust Cover for Micro + Monitor £9
- User port/MIDI upgrade £45
- UHF TV Modulator £PAO

Unbeatable Sale Offers on Archimedes Micro

(Extended by Popular Demand)

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, (A420)
A420/1	Upgraded to 4MB RAM 40MB Hard Disc (A440), MK II Learning Curve pack and Acorn DTP pack
A440/1	High Res 14" Multiscan Colour Monitor
540/1	High Res Multiscan Monitor & Panasonic KX-P1180 Printer
A3000	Upgraded to 2 Megabyte of RAM

+ 12 months FREE On-Site Maintenance

Archi Accessories

- NEW Multitasking RISC OS £29
- 3.5" 800K 2nd Floppy Drive (305/310) £118
- 5.25" 800K external Floppy Drive £85
- I/O Podule (with Analogue port, User port, & 1MHz bus) £78
- MIDI add-on to I/O Podule £29
- MIDI Expansion Card £65
- Sound Sampler Mono (Armadillo) £129
- Sound Sampler Stereo (Armadillo) £166
- Sound Sampler Stereo /Midi (Armadillo) £186
- Chromalock Podule (Wild Vision) £275
- Econet Network Board £45
- Archimedes IEEE Interface Adaptor £269
- Dual RS232 Podule £195
- 16 bit parallel I/O Card £195
- NEW – Archi MK II Replacement Mouse £39
- PC Emulator NEW Faster Version £62
- Software Developers Toolbox £149
- Floating Point Unit £455
- SCSI Adaptor Expansion Card £169
- Keyboard Extension Lead £6
- 2 Podule Backplane £25
- 4 Podule Backplane £38
- Fan for above backplanes £8
- Risc Os Extras Software Disc £5
- Smoked Perspex Low profile Keyboard Cover £8
- Ethernet Card £220

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

8 Meg RAM Upgrades

- **R810** – A410/1 upgraded to 8MB £910
- **R820** – A420/1 upgraded to 8MB £859
- **R840** – A440/1 upgraded to 8MB £749
- **R814** – R140 upgraded to 8MB £749

Turbo Charge Your Archimedes

Increase the speed of your Archimedes by a factor of THREE to SIX times (depending on the software you are running), with Watford's ARM3 Upgrades.

- **ARM-3** 20MHz Upgrade Board £339
- **ARM-3** 30MHz Upgrade Board £389
- **MEMC** 1A Upgrade £49

(ARM 3 price includes a FREE Chip extraction tool)
(Special Offer – If purchased together with an Archimedes Micro, then not only will we fit the card Free of Charge but we will also reduce the price by £40 i.e. You pay only £309 for ARM3 20MHZ & £359 for ARM3-30MHz)

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

- **R302**-A3000 – to 2MB RAM Upgrade £62
- **R304**-A3000 – to 4MB RAM Upgrade £179
- **R311**-A305 – to 1MB RAM Upgrade £75
- **R312**-A305/310 – to 2MB RAM Upgrade £245
- **R314**-A305/310 – to 4MB RAM Upgrade £435
- **R412**-A410/1 – to 2MB RAM Upgrade £49
- **R413**-A420/1 – to 4MB RAM Upgrade £95
- **R414**-A410/1 – to 4MB RAM Upgrade £137

Archimedes Hard Disc

Watford's Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are self parking. 40Meg & 53Meg drives are fast 24mS type, while 20MHz are 28mS.
P.S. A310 upgrades require a backplane and a fan.

- **3HDP** – Hard Disc Podule only £135
- **3HD20** – 20Meg H' Disc + Podule for 310 £299
- **3HD40** – 40Meg H' Disc + Podule for 310 £389
- **3HD50** – 53Meg H' Disc + Podule for 310 £474
- **4HD20** – 20Meg Hard Disc for 410 £165
- **4HD40** – 40Meg Hard Disc for 410 £269
- **4HD50** – 53Meg Hard Disc for 410 £399
- A3000 20Meg Hard Disc + Podule £359
- A3000 40Meg Hard Disc + Podule £489

Convert your Archi 410 to a 420 or 440 with Watford's unique Upgrade Kits

- **UP10** – to 2MB RAM + 20MB Hard Disc £210
- **UP15** – to 2MB RAM + 40MB Hard Disc £325
- **UP20** – to 4MB RAM + 20MB Hard Disc £299
- **UP30** – to 4MB RAM + 40MB Hard Disc £415
- **UP40** – to 4MB RAM + 53MB Hard Disc £475

Silicon Vision

- Gerber Plot £95
- Risc Basic £120
- Solid CAD £120
- Super Plot £30
- Super Dump £22
- ROBO LOGO £69
- Solids Render £120
- Solid Tools £279
- Arc PCB Professional £275
- Realtime Solids Modeller £138

Desk Top Publisher

- **Acorn's Archi DTP Package** £125
- **Impression 2 DTP Pack** £139
- **Impression Junior** £79
- **Tempest DTP Package** £95

Archi Wordprocessors

- Wordwise + Disc £24
- Image Writer £25
- Interword Disc £24
- 1st Word Plus – 2 £69
- Archie Spell Master £39
- P.Spellchecker £40
- View £45
- Graphic Writer £23
- EasyWord £30

Databases

- AlphaBase £36
- Knowledge Organiser £45
- Multistore £195

Spreadsheets

- Intersheet Disc £24
- Sigmasheet £55
- Viewsheet £45
- Schema £99

Business Graphics

- GammaPlot £39
- Interchart Disc £20
- Sigmaplot £39

Integrated Packages

- Logistix £85
- Pipedream 3 £120
- Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications £105

Graphics, Art, Design & Games

GRAPHICS

- Atelier £65
- Artisan II £47
- Autosketch II £68
- Craftshop 1 & 2 £28
- Euclid 2 £52
- Graph Box £64
- Kermit £46
- Mogul £19
- Poster £82
- Pro Artisan £72
- Render Bender £58
- Snippet £28

GAMES

- ArcPinball £20
- Apocalypse £23
- Arcade Soccer £15
- Avon £16
- Battle -Tank £11
- Break 147 £20
- Bug Hunter £14
- Casino £18
- Caverns £14
- Chocks Away £20
- Class Mate £35
- Conqueror £18
- Cops £14
- Corruption £18
- Drop Ship £17
- Enthar Seven £22
- E-Type £17
- E-Type Designer £15
- E-Type Extra 100 miles £15
- Freedom Fighter £21
- Holed Out Designer £16
- Holed Out Golf £15
- Hostages £17
- Ibix the Viking £14
- Inter Dictor 2 £27
- Jet Fighter £10
- Knowledge Organiser £49
- Manchester United £-
- Nevryon £17
- Olympics £15
- Real McCoy £25
- Repton 3 £17
- Sporting Triangles £24
- Superior Golf £17
- Talisman £14
- The Pawn £19
- Thundermonk £11
- U.I.M. £23
- White Magic £15
- White Magic 2 £15
- Zarch £13

Miscellaneous

- Armadeus Sound £60
- Arccomm Pack £24
- BBC DFS Reader £15
- Genesis £65
- Hearsay Comms Pack £50
- Rhapsody in Blue £42
- Toolkit (Clares) £42

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77	£77 each
ANSI C Release 3	£125
Assembler; LISP or Prolog X	£149 each
LOGOTRON LOGO	£55
ROBO LOGO £49	TWIN EDITOR £25
RISC BASIC £85	BASIC Compiler £77

MINERVA's Archimedes Software

Sigmasheet	£55	Sales Ledger*	£53
Home Accounts*	£36	Purchase Ledger*	£53
Stock Manager*	£53		
Nominal Ledger*	£53	Reporter	£29
Ancestry	£59	Mailshot*	£29
System Delta+	£55	MultiStore	£195
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£85** per Module or
£325 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System



THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
Only £21

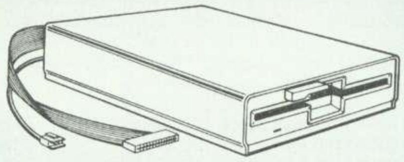
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during January

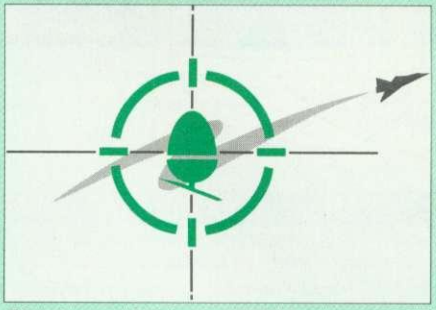
ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S £899	Filestore E40s £749
Filestore E60S £949	Ecolink £270

(Carr. £2 to £7 depending on the weight)

Watford Electronics are Acorn's major Qualified Dealer and Econet Referral Centre. Please telephone our Education Department for all your educational needs.

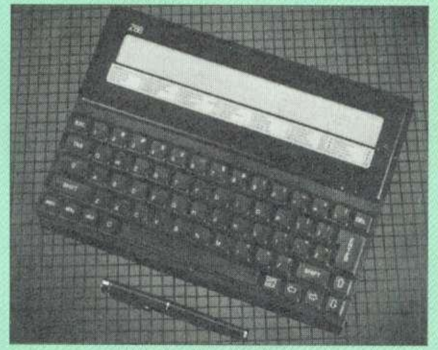
Take the Acorn Archimedes Test Flight and win yourself a Supersonic Concorde Flight



Take the new Archimedes 420/1 Learning system home by booking a slot in Watford's Acorn approved Test Schedule. Call in at our showroom and check it out for yourself – Leave a deposit and you may borrow one of our specially chosen Learning Curve System for up to 14 days. Be satisfied before you buy. Return the system in good order for a complete refund. At the same time you may enter our FREE aviator competition. You could win stunning prizes; Fly in First Class Luxury in Concorde; Learn to fly a helicopter' Take a weekend of flying lessons; and many more prizes. So why not take a test fly at Watford.

For Archimedes Mk II Hand Scanner, Real Time Digitiser, Graphics Tablet, Software & Books, see pages 5, 8, 10 & 12 of our advert.

Z88 Portable Micro



Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

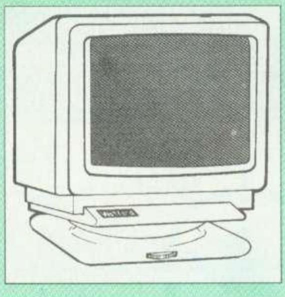
Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£18.00
• 128K RAM Pack or 128K EPROM Pack	£45
• 512K RAM Pack	£175
• Z88 Eprom Eraser Unit	£35
• Z88 Spellmaster for Pipedream	£51
• Z88 Carrying Case	£9
• Z88 Computing Book	£9.95
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£9
• Z88 Parallel Printer Cable	£25
• Z88 to Archi Link	£15
• Z88 to BBC Link £20	• Z BASE £56
• Z88 to PC Link II £30	• Z TAPE £42
• Z88 to Macintosh £52	• Z TERM £42
• Z88 Mains Adaptor £9	• Z88 Modem £149

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc., on demonstration in our showroom, for you our customers to evaluate before you buy.

Continued→ → → → → → → → →



12 months FREE maintenance on site

Microvitec Monitors

- **1431** – Standard resolution as used on the BBC television computer programme £172
- **1451** – Medium resolution, suitable for word processing in mode 0 £215
- **Cub3000** Medium Res for A3000 £195
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **1451AP** RGB + PAL and AUDIO £255
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Multiscan Colour

- **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch £399
- **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1 £599
- **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base **Launch price £349**
- **TAXAN** 770LR Low Radiation Multiscan £393
- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen £393
- **TAXAN** 795-A TRINITRON 0.26 Dot pitch 1024 x 768 Non interlaced £449

Philips

- **BM7502** 12" Hi-res Green Monitor £70
- **CM8833** 14" Med. Res Colour Monitor £185

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £169

Dust Cover for Philips Monitors £6

(Securicor carriage on Monitors £7)

Swivel Bases

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Canon Printer

Canon Bubblejet BJ 130E	£410
Canon Bubblejet 10E	£269
BJ 10E Cut Sheet Feeder	£58

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors; all Panasonic, Hewlett Packard (3 months) and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

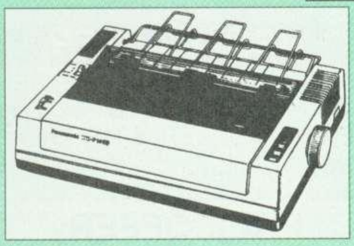
Roland Plotters

(Official Roland Appointed Distributor)

- **DPX 2500** £2389
- **DXY 1100** £545
- **DXY 1200** £715
- **DXY 1300** £899

Panasonic Printers

12 MONTHS FREE MAINTENANCE ON SITE



FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of fanfold paper for other micros, please specify)

- **KX-P1081** 9pin 80col. 144/28 cps £124
- **KX-P1180** 9pin 80col. 192/38 cps £134
- **KX-P1123** 24pin 80col. 192/63 CPS £175
- **KX-P1124** 24pin 80col. 192/63 CPS £185
- **KX-P1540** 24pin 136col. 240/80 CPS £390
- **KX-P1592** 9pin 136col. 216/45 CPS £219
- **KX-P1595** 9pin 136col. 288/61 CPS £345
- **KX-P1624** 24pin 132col. 192/63 CPS £318
- **KX-P1695** 9pin 132col. 330/86 CPS £345

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £19.50
- Colour Textile Cartridge £29
- Black Cartridge £11.25
- Black Textile Cartridge £17
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Citizen Printer

120D Plus	£105	124D Printer	£175
Prodot 9	£275	Prodot 24	£275
Swift 9	£198	Swift 24	£238

- Prodot Cut Sheet Feeder £120
- Swift 24 Colour Option £34
- Swift 24 Ribbons Black **£4** Colour **£13**

Hewlett-Packard Printers

- Desk Jet 500 **£379**
- Desk Writer **£609**
- Desk Jet Cartridge **£15**
- Paint Jet Colour **£676**
- Quiet Jet Plus **£399**
- Scan Jet Plus **£725**
- HP Think Jet **£250**
- Rugged Writer **£895**

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £119
- **LC10-II** 9pin 80col. 180/45 CPS £145
- **LC15** 9pin 136col. 180/45 CPS £250
- **LC24-10** 24pin 80col. 180/60 CPS £175
- **LC24-15** 24pin 136col. 200/67 CPS £315
- **XB24-10** 24pin 80col. 240/80 CPS £379
- **XB24-15** 24pin 80col. 240/80 CPS £489
- **XB-24** Colour Kit £35
- **LC-200** Colour 9pin 80col. 180/45 CPS £185
- **LC-24-200** 24pin 80col. 222/67 CPS £229
- **LC24-200** Colour 24pin 80col. 222/67 CPS £265

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC24-10; 15 & 200	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15	Black **£4**;	Colour **£6**
LC-200; LC24-200	Black **£5**;	Colour **£12**
XB24-10; XB24-15	Black **£5**;	Colour **£12**

Laser Printers

Canon LBP-4	4ppm	£715
Canon LBP-8 III	8ppm	£1249
Epson EPL7100	6ppm	£749
HP Laserjet IIP**	4ppm	£725
HP Laserjet III	8ppm	£1199
HP Laserjet IIID	8ppm	£1820
Panasonic KX-P4420	8ppm	£699
Panasonic KX-P4450i	11ppm	£1105
Panasonic KX-4455 Postscript	11ppm	£1799
Qume Crystal Print WP+		£749
Qume Crystal Print Ser. 2		£1065
Qume Crystal Print Publisher 2		£1899
Star LP-8 II		£1099
Star LP-8 Star(post)script		£1299

** Lower Paper Cassette Tray & Premier Collection Software, **FREE** with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2 & 4	£60	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£63
KX-P4420/50	£25		

Laser RAM Upgrades

HP Laserjet II RAM		Laserjet III 1MB	£129
Jetware II 1MB	£120	GQ5000 512k	£99
Jetware II 2MB	£199	KX-P4420 1M	£249
Jetware IIP 1MB	£125	KX-P4450i 1M	£299
Jetware IIP 2MB	£200	KX-P4450i 2M	£575

Laser Drum & Developer

- Epson Drum GQ5000 £129 EPL7100 £129
- Panasonic 4420 Drum £69 Developer £59
- Panasonic 4450 Drum £99 Developer £80
- Qume Drum £76

Jetpage Postscript Cartridge

for Laserjet II £369 IID & III £375

Epson Printers

EX800	£410	LQ1050	£540
EX1000	£540	LQ1060	£619
FX850	£295	LQ2550+	£729
FX1050	£370	LX400	£117
FX1060	£599	LX850	£179
LQ400	£179	SQ850	£515
LQ550	£246	SQ2550	£779
LQ850	£439	TLQ4800	£1449
LQ860 Colour	£499		

Cut Sheet Feeders for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Important Notice to All our Customers

Watford Electronics only supplies printers fitted with British Specification 240V AC Mains 3 core cable with connections for Live, Neutral and Earth. We do not sell, nor intend to supply grey imports from Europe or Hong Kong with incorrect 220V European mains connections (2 core cable!) which could be dangerous to the end user.

Megabuffer 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£36	£32	£4

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18;** Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

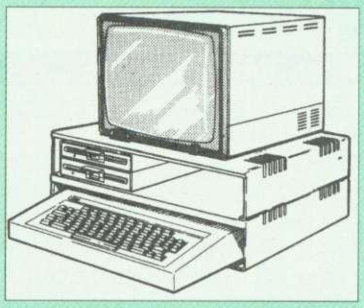
(Auto Printer Sharers – Centronics)

- 2 In/2 out **£135**
- 4 In/2 out **£169**
- 8 In/1 out **£199**

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

Plinths for the BBC B & Master 128K Micros

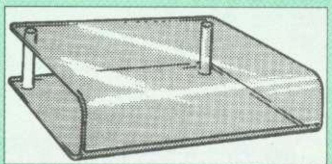


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	£13
Double BBC Plinth	420 x 310 x 210mm	£24
Single Master Plinth	490 x 310 x 105mm	£14
Double Master Plinth	490 x 310 x 210mm	£26

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper **£7**
- 2,000 Sheets 9.5" x 11" Fanfold Paper **£11**
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold **£21**
- 1,000 Sheets 15" x 11" Fanfold Paper **£9**
- 1,000 Sheets true A4 Fanfold Paper 70gms **£11**
- 2,000 Sheets true A4 Fanfold Paper 70gms **£21**
- Teleprinter Roll (Econo paper) **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

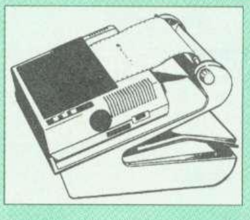
Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110	for KX-P1081, 1592 & 1595	£8
P115	for KX-P1180	£8
P145	for KX-P1124	£8
P140	for KX-P1540	£10

Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red **£9.95 each**

Professional Printer Stand

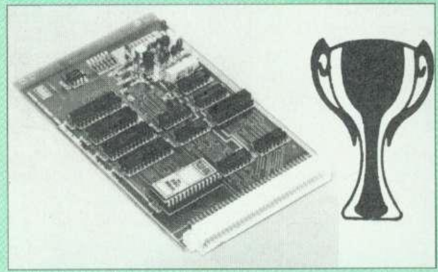


The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)
132 Column version £28 (carr. £4)

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



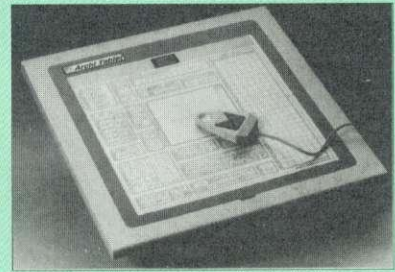
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	**£16**
New Risc-OS Software Upgrade	**£39**

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)
(Now, fully LinCAD compatible. Recommended by Linear Graphic).

Special Price £225
(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	**£16.00**
• Watford DFS Kit complete	**£69.00**
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	**£12.00**
• DFS Manual (comprehensive)	**£6.95**
• Acorn DNFS ROM	**£17.00**
• Acorn ADFS ROM only	**£25.00**
• Acorn 1772 DFS ROM Kit	**£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	**£44.00**
• DDFS Manual	(No VAT) **£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	***£5***
• *10 x 5.25" D/S D/D 40T (745)*	***£5***
• *10 x 5.25" S/S D/D 80 Track (746)*	***£7***
• *10 x 5.25" D/S D/D 80 Track (747)*	***£7***
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	***£11***
• *10 x 3.25" S/S D/D 40/80 Track*	***£7***
• *10 x 3.25" D/S D/D 40/80 Track*	***£8***
• *10 x 3.5" Double Sided High Density*	***£15***

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x* ***M3*** *3.5" D/S D/D 80 Track*	***£7***
• *10 x* ***M9*** *3.5" D/S High Density*	***£14***
• *10 x* ***M4*** *5.25" S/S D/D 40 Track*	***£5***
• *10 x* ***M5*** *5.25" D/S D/D 40 Track*	***£5***
• *10 x* ***M7*** *5.25" D/S D/D 80 Track*	***£7***
• *10 x* ***M8*** *5.25" D/S H/D Hi-Density*	***£11***
• ***M2*** *3" Double Sided*	***£2.50 each***

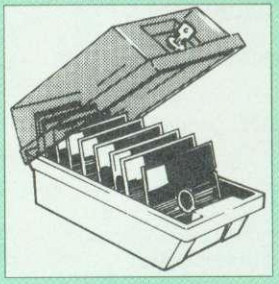
CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

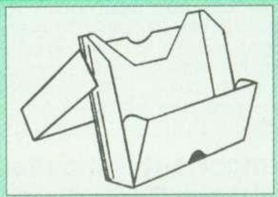


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

• **M35** – holds up to 50 5.25" discs	**£4.95**
• **M85** – holds up to 95 5.25" discs	**£6.95**
• **M25*** – holds up to 25 3.5" discs	**£4.95**
• **M50** – holds 50 3.5" discs	**£6.50**
• **M10** – holds 8 of No. 10 Data Cartridges	**£15**

* Not lockable

Plastic Library Cases



Holds up to 10 3.5" Discs.	**£1.50**
Holds up to 10 5.25" Discs.	**£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

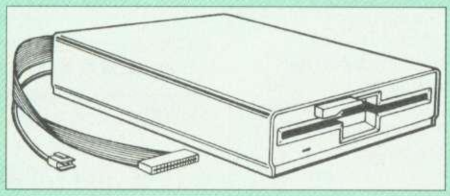
BULK PACK DISCS in lots of 100

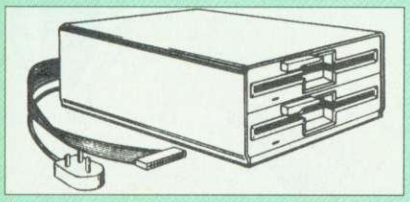
Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50	£52 for 100	

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below. The tinting of the boxes indicates 40/80 track switchable disc drives. For ease of use, the switches are mounted on the front panel.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. *(Turn to the 4th page of our advert for the Plinths).*
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS 400S £72		CS 400S £82	
800K (1,44M		CLD 800S £142		CD 800S £159
• TWIN Disc Drive Case, complete with Power Supply & Cables **£43** **Securicor carriage on Disc Drives £6 to £7**				

Prefix ***C*** *= Cased Drive* *Suffix* ***S*** *= 40-80 Switchable*
L *= Less PSU*
S *= Single*
D *= Double*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Refurbished Disc Drives now available
CLS400 £50; CLD800 £98; CS400 £59; CD800

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)



3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

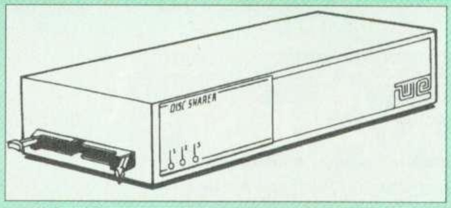
- **CLS35 400K Unit £62**
- **CLD35 Twin 800K £109**

Drives with built-in Power Supply Unit

- **CS35 Single 400K £84**
- **CD35 Twin 800K £126**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

DISC DRIVE SHARER

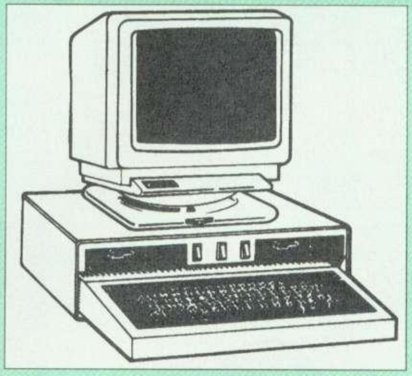


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables Offer Price : **£55**

CDPM 800S DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £165

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £154

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

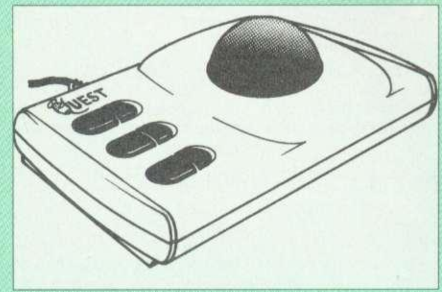
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£32**
QT-20 Archimedes Version **£35**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

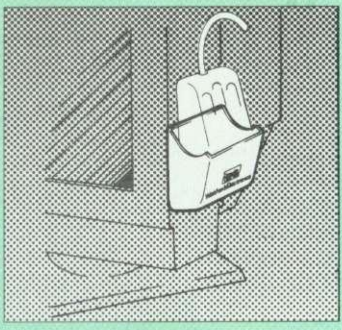
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

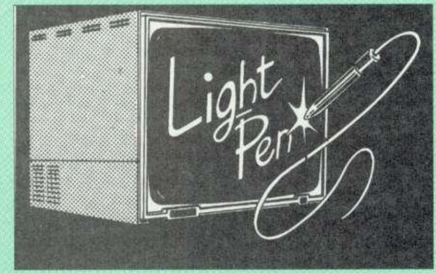
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.
The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.
All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW

At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

High Res Laser Direct Card for Canon LPB4 Laser Printer	£325
LPB4 Printer plus Card	£1025

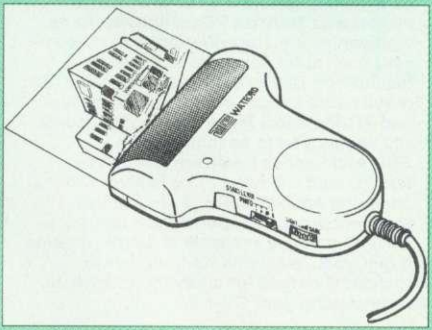
(For demonstration, call in at our retail shop)

VISA Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

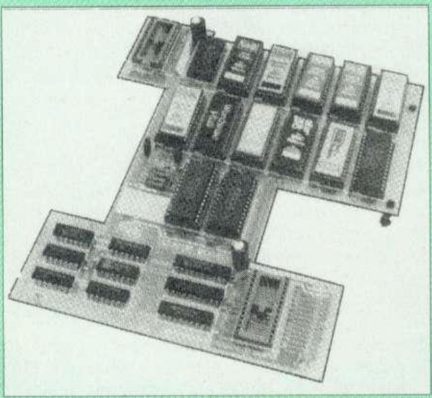
AHS-4 Archi 300/400 Version	**£149**
AHS-3 Archi A3000 Version	**£175**

Continued→ → → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

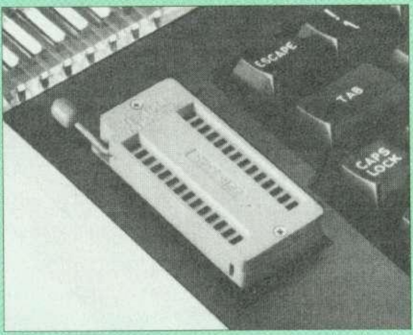
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	£11
• Spare Cartridges	£2.75
• Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will accept the new larger PIggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted £3

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, .Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	£36
	Aries B-12C	£5

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

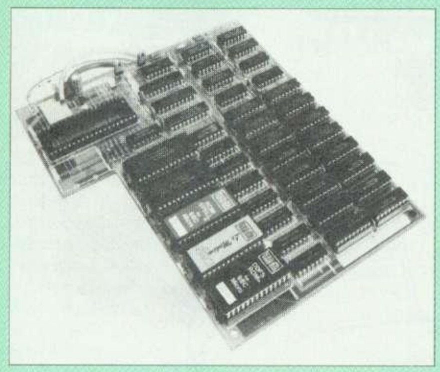
Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 £25

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM **£48**
- ROM/RAM card with 64k dynamic RAM **£65**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

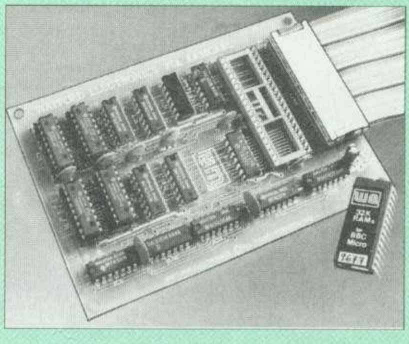
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£9**
- 16k Dynamic RAM for Upgrade **£13**
- Battery backup **£3**
- Read and Write protect switches **£2 each**

Complete ROM-RAM board All options installed **£115**

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc). 4 further maths programs. **£11.25**
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. **£17.00**
- ECOLOGY O-Level program. **£20.00**
- POLYMERS O-Level program. **£20.00**
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20.00**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20.00**
- Computers at Work – Primary **£17.35**
- Introducing Geography 11-17 years **£17.50**
- Electric Fields 6-14 years **£11.25**
- Espana Viva – 3 Discs **£19.95**
- WHITE KNIGHT Chess game **£16.00**
- A Vous La France **£29.00**

More Educational Software

- **FUN SCHOOL 2 – Red:** Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£12.25**
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£12.50**
- **FUN SCHOOL 3 – Red** **£19.95**
- **FUN SCHOOL 3 – Green** **£19.95**
- **FUN SCHOOL 3 – Blue** **£19.95**
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Wordwise plus £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
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- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
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- BBC B, B+ and Master compatible.

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(N.B. Word Aid requires a Disc interface in your Micro)

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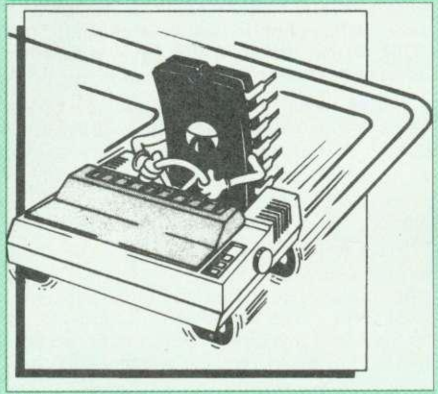
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DISC Version for BBC B & B+	**£14.00**
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(When ordering please specify for which Micro & 40 or 80 track Disc)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

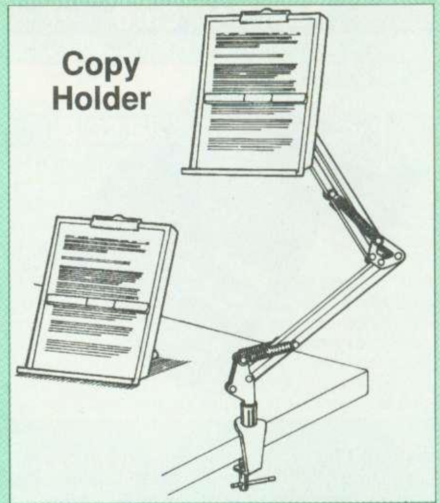
Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

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Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

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CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

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NEW

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and heirarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95

The Complete BBC Computer User Handbook

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL – Uses and abuses of computers.

HARDWARE – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

HARDWARE RUNNING BBC-BASIC – All BBC machines are described with their differences. Compatibility between the various BBC machines. Networks. The Archimedes and its advantages.

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Only: **£14.95** (Book No VAT)

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Continued→ → → → → →

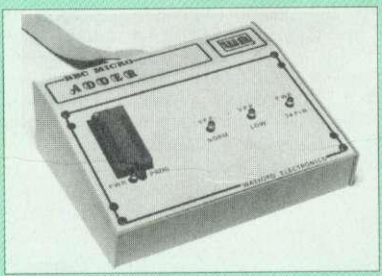
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Special Offer £18

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ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!
The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£32**(carr £3)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£34** (carr £3)
- Spare UV tubes. **£12**

Watch this space for our forthcoming new products for the Archimedes Micro

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

Aerosol Dust Spray

Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

Spares for BBC Micro

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Master Casing	£49	Power Supply	£59

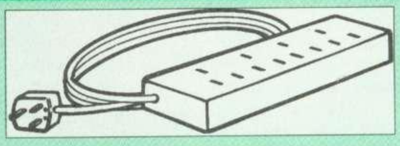
Replacement Flexible 17 way Keyboard Connector **£4**

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Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

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ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

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Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

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28 pin ZIF SOCKET (Textool) **£6.95**

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(All ready made and tested)

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Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

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Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

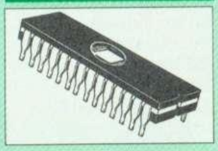
£14

Watford POWER DUCK £8

CHIP SHOP

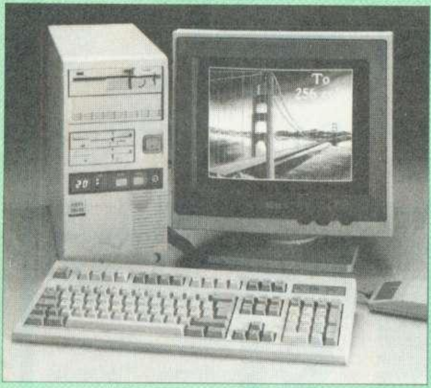
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Assorted ROMS



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In his independent review (Computer Shopper, May 1990), the reviewer writes, – "Overall, the single most outstanding feature has to be the price tag. A notebook PC, with a hard disc selling for below £1,000 has no competition at the moment. If you have a small briefcase, weak arms or just like the concept of a truly portable computer then this is your man".

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EIGHT BITS

£10 FILE SEARCH

The first program for this month comes from **Andrew Pepperell**, and it assembles to make a machine code program called FSEARCH which will search a file for a particular byte, and report all occurrences. The full syntax is:

```
FSEARCH <fname> <byte>
```

Upon typing this, all occurrences will be listed (see below), and the number of occurrences reported, in decimal. This can be changed to hexadecimal by simply deleting the SED and CLD instructions from the source code. The second parameter, <byte> can be expressed in one of three ways. Firstly, as a decimal number just using the digits 0-9, secondly as a hexadecimal number preceded by an ampersand sign, or finally as the Ascii code of a character, preceded by quotation marks. For example, the following are all valid:

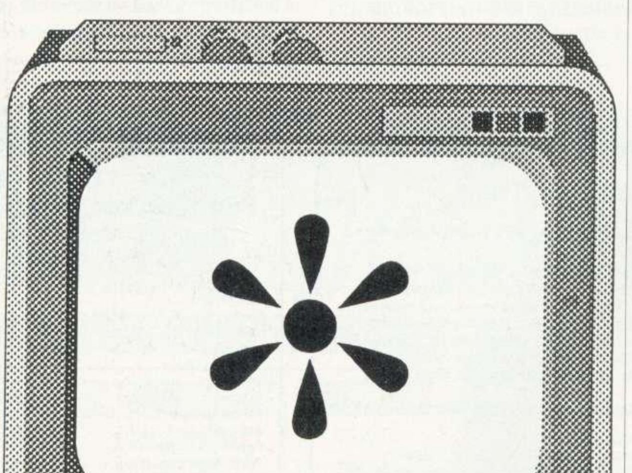
```
*FSEARCH Prog 98 *FSEARCH
File &D *FSEARCH Text "r"
(the closing " is not
obligatory).
```

The way the matches are displayed is dependent on the load address of the file. This is first read in, and incremented every time a byte is read from the file. If a match is found, this address is printed. This shows which bytes would contain a particular value if the file were *LOADed into memory, so if a machine code program was tested, which loaded at &900, then the address reported would be an offset from &900 not 0.

The program works by first determining the filename from the syntax, and placing a carriage return after it. Then, the start of <byte> is found, and the relevant routine is called to interpret it and to place a numerical value into searchbyte. Then, the file's load address is read, and stored. This value is then incremented every time a byte is read from the file.

A comparison is made every time a byte is read as well, and if the two bytes match, the value originating from the load address is printed, and the number of occurrencesis incremented.

When the end of the file is reached (carry set from OSBGET), the number of occurrences is printed.



£10 SCREEN BLANKING

I wrote a screen blanking program myself which was published in the magazine about a year ago, but **Simon Young** of Fareham has produced a vastly improved version which is listed here. He has also provided a witty and amusing description of how the programs work. I will let Simon continue...

Programming a computer is a curious pastime, and is not without its hazards for both you and your machine. While programming it is frequently necessary to leave the computer to its own devices for a while. It is at these times that your mental health is perhaps most at risk: How many times have you returned to your seat before the hallowed beast the next day, only to find that it has been switched off, your program or result lost, and your sanity with it? But who has committed this vile crime? Given the wild reaction it tends to provoke, it is perhaps hardly surprising that nobody has turned it off for you and one is left with the deduction that either the cat has demonstrated extreme dexterity or LGM (little green men) have been at work.

For your computer, however, damage is done to the monitor by being left on. The problem, which is more notable with monochrome monitors, is caused by leaving a display unchanged for extended periods of time.

This leads to the 'burning' of a faint but permanent shadow of the display into the phosphor of the monitor.

Such burn-in may be observed in its worst form in computer laboratories where it is not uncommon for a computer to be turned on at the start of the day and left with the power-up display until 5pm when everybody goes home.

The simplest answer to both problems would be to turn off the monitor when you intend to leave the computer unattended. This, however, is not really the best of solutions. In the first place, computers undertaking tasks are prone to attract the LGM by the strange beeping noises which they emit.

Secondly, and perhaps more importantly, monitors are high voltage devices. Consequently, when they are turned on or off they can cause voltage spikes in the mains supply which may lead to the corruption of any installed disc or, rarely, to the crashing of your computer. Either event may have disastrous consequences.

A screen blank utility is thus the obvious solution to both problems. I have written two programs, one which is Ram

based and one which conveniently operates from Rom.

Both programs make use of two of the pre-packaged interrupt routines (events) provided by the BBC micro. Each time a key is pressed, an event is generated. This event (event number 2) is trapped and used to enable the sound and VDU output, and to set the interval timerto an appropriate interval: I have chosen 15 seconds, but you may prefer longer.

When the interval timer crosses zero (ie, if after 15 seconds no key is pressed) another event (event number 5) is generated. This too is trapped, and is used to turn off the sound and VDU output.

Turning on and off the sound output is a simple task performed by OSBYTE &D2 (*FX210), but clearing the screen display is rather more difficult. There are several ways of going about blanking the display, but the most direct is to make use of the 6845 cathode ray controller chip (CRTC). This chip, which is the heart of the BBC micro's video output circuitry, must be able to blank both the display and the cursor for the delay caused if the SAA5050 character generator is used (meaning, when in mode 7).

You may therefore blank the display by writing directly to it and cursor blanking delay bits of the interlace and delay register (R8) ofthe CRTC.

However, when you do this you must be careful not to alter other bits of this register, because this will cause strange VDU effects and may even damage the monitor. So you must differentiate between mode seven and other screen modes when blanking and reinstating the VDU display.

This is done by checking the contents of address &355, which contains the number of the current screen mode.

The Ram based version of the screen blanker fullfills these requirements in the most basic form so that the assembled program is just under one page in length. Provided your machine is not cassette based, or part of a network, the assembled code can therefore be installed at &900 (without overwriting any of the memory reserved for stack use) and will therefore not reduce program workspace.

If you should require to turn off the Ram based screen blank program for example to make use of the user events for another purpose, this is best done bythe following commands:

```
*FX 247,0 *FX 13,5 *FX
13,2
```

The Rom based screen blank program is a more complicated program, although in essence it is the same. This should run on a BBC Master with sideways Ram, or a BBC with a sideways Ram bank. In either case the user zero page workspace area, (&70 to &8F) is preserved, so that other programs which make use of this area of memory should not crash. When run the program assembles to &4000 and this should be saved using the command:

```
*SAVE fname 4000 4311
```

and then loaded into the chosen bank of sideways Ram, ie for Master users:

```
*SRLOAD fname 8000 <rom-
bank> Q
```

If you have a Watford Electronics Rom/Ram expansion board (as I do) then you may assemble the code directly into a chosen bank by altering the following lines of the Rom based program:

```
320 ?(&FF30+R)=0 330 FOR
IC=0 TO 3 STEP 3 350 :
4500 ?&FF38=0
```

where <R> is the hexadecimal number of the Ram bank to be programmed.

The Rom based program may, of course, be loaded into any bank of sideways Ram that is present. It responds to the commands (non-case specific):

```
*BLANKON *BLANKOFF
```

which are reported in the normal way when a *HELP enquiry is made of the Rom (which calls itself "BLANK"). When the command *BLANKON is made the Blank Rom installs its vectors which point event numbers 2 and 5 to routines within the Rom and enables these events which then perform in exactly the same manner as the Ram based version. On the command *BLANKOFF, event numbers 2 and 5 are merely disabled.

If loaded into a bank of sideways Ram that has a higher priority than any filing systems which are present then the Blank Rom also reponds toa break. In this case the Rom declares its presence in the power-up message, installs its vectors and enables event numbers 2 and 5. If you wish to have the Rom state its presence in this fashion, but do not wish the screen blank to be active on power-up then the following amendment to the program should be made:

```
1250 JMP pull
```

More usefully, you may customise your own version of the Blank Rom to set up your computer the way you like it on power-up.

For example, you may wish to select a different screen mode, or issue set-up instructions to your printer or even, with care, issue commands to other paged Roms.

If you wish to change the time delay between key press and screen blanking this may be done by calculating the *timetogo* data (lines 1590 to 1630 inclusive in the Ram based program or lines 4060 to 4100 inclusive of the Rom based program) as follows: The *timetogo* data is a five byte number (low byte first) generated by the algorithm:

```
&FFFFFFFFFF - (S * &64)
```

where S is the number of seconds (in hexadecimal) required between the last keypress and the screen blanking: For example 1 minute would give a result of:

```
&FFFFFFE890
```

so that the *timetogo* data would be:

```
EQUB &90 EQUB &E8 EQUB
&FF EQUB &FF EQUB &FF
```

£10 BASIC PROTECTOR

Here is another interesting program from **Andrew Pepperell**. As the name suggests, this program generates a machine code called PROTECT, which provides a means of protecting Basic program listings. The required syntax is:

```
PROTECT (<line>)
```

The parameter is optional, and if included will signify where the protection will start (or more accurately the line before the first line to be protected). If omitted, the protection starts from the first program line. After the program has been used, typing the Basic command LIST will only list those lines up to (<line>).

One thing to note is that (<line>) (or the first program line) should be either a REM statement or a colon. This is because the utility works by placing a VDU 21 code at the end of the line, and some commands will take this to be part of their syntax, and errors will be produced. Similar measures need to be taken at the end of the program,

```
 10 REM Basic program protection
 20 REM by Andrew Pepperell
 30 REM for B/B+/M/C/E
 40 REM (c) BAU Feb 91
 50 :
 60 PROCassemble
 70 PROCchecksum
 80 PROCsavecode
 90 END
100 :
11[illegible]cksum
[illegible]
130 FOR M%=start TO P%-[illegible]
140 I%=I%+?M%
150 NEXT
160 IF I%=474[illegible]
170 VDU 7 18[illegible]or in Code."
```

although ENDPROC, END and STOP seem to be unaffected.

The program works by first deciding if (<line>) was used in the syntax. If no parameter was passed, the start address is deemed to be PAGE+1, and then the protection routine proper is called. If <line> was specified, the decimal number is read in, and the address of the corresponding line is found. This is then passed to the protection routine. The protection routine works by first taking a section of memory from the end of the first line to the end of the program (TOP), and displacing it by one byte. Then, the stored length of the first line is incremented, and a 21 code and a carriage return are inserted into the end of the line (the relocation was necessary to provide a space for the &D byte). A VDU 6 code is then added to the end of the program (to re-enable the VDU), along with an &D and an &FF. The TOP variable (&12 and &13) is then increased by 2, and then the routine exits.

The main use for the program is to allow small parts of the program (or small programs) to be hidden away from the listing. For this, it would be necessary to ensure the relevant lines are at the end of the listing before running PROTECT.

A possible refinement would be to add a second parameter to specify where the protection would end (as it is, the end of the program is assumed). Combining PROTECT with the BASMOVE routine listed in last month's Eight Bits would really be necessary to make the program work best, as the Basic Rom takes quite a while to run through all the hidden lines while LISTing a program, and so it is best to only hide small parts of a program.

If this is done, the user could be quite unaware that there is anything there at all. As the protection routine is quite simple to 'crack', then it is important to try and keep the user unaware that something is amiss!

£10 STOP PRESS

Stop Press appears to be a very popular package with readers of this column, and following the range of tips printed last year, here are a new collection from

Stop Press enthusiast **Tim Riches** of Worcester.

1. When drawing any shapes, strictly observe the scale along the sides and they won't appear squashed when you print them out.

2. For interesting results use a letter background. Load your required font, click the 'Graphics' icon, click the 'Patterns' window, and then the 'Select' window. Press 'Move' and select the letter you want. Select the 'Paint/Spray' window, and watch the results!

3. Print out your entire collection of fonts and all your clip art on separate pieces of paper, and put them in a ring-bound folder, marked with the fonts names, and clip art filenames. If you have a lot, you should also make a note of which disc they are on. This will save you a lot of time hunting through discs, cataloguing and test loading fonts and clip art to find the right style or picture.

4. When on the main screen area, you will find that you can click the 'Quick Click' window at any time without the need to 'Cancel' what you are doing. After you have selected what you want, a single press of the 'Cancel' button will take you straight back to your work.

5. Instead of copying a certain area to somewhere new, and then wiping the old, it is easier to select the 'More Goodies' window from the 'Goodies' menu, and then click the 'Shadow' window on. This changes the 'Copy' window in the 'Paste' menu to 'Move', thus allowing areas to be moved instead of copied.

6. If you have a double disc drive, then while using your Page discs in drive 0/1, you can use your System disc without constant disc swapping. Select the 'Goodies' icon, and then click the '*Command' window from the menu. Enter 'DRIVE 1' (the * is also printed for you). You will now find, especially when printing out, then the page is loaded from side 0/1, and the printer codes from the System disc in drive 1. Hence, no more disc swapping.

YOUR CONTRIBUTION

We welcome contributions of 300-1500 words, with or without program listings, on topics of interest to eight-bit BBC/Electron users. Particularly welcome are items on applications, ie for users, not programmers, although interesting graphics programs, which as you know are a specialty of *BAU*, are also sought.

Topics for which we would like to receive more submissions are the programming of powerful printers, hints and tips on the popular databases and spreadsheets, networking, and hints on best use of the wide range of hardware add-ons, (except sideways Ram boards) such as the products produced by companies like Watford Electronics, Morley Electronics, and so on.

Of less interest are programs which just enhance the operating system, or provide features which are already found on commercial utility Roms.

Please send your contribution with both the text and any listing on the disc, and on paper as well. Please ensure there is sufficient documentation (at least 300 words), and that the listing is in the standard *BAU* format (one statement per line, lower case variables etc.), and send it to David Atherton, Eight Bits, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ.



MAD ABOUT CAD

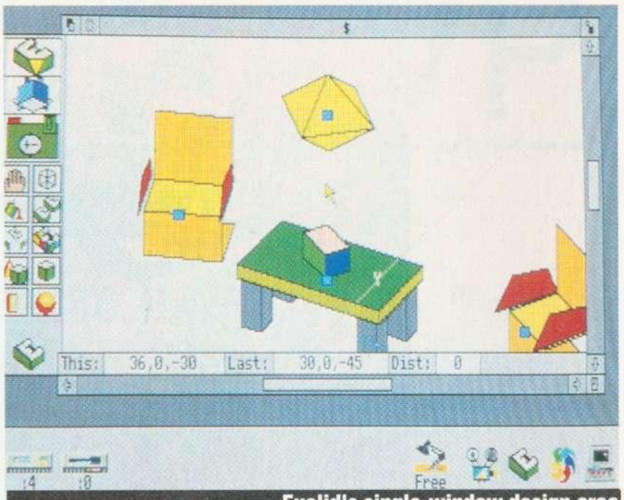
The Arc offers great possibilities for design. CLIVE GRINGRAS and RICHARD BROWNING offer two different views of the packages available

Computer aided design (CAD) has moved down some interesting avenues during the past 10 years. Third angle projections of engineering components are no longer the sole use for computer graphics. CAD is now used hand in hand with CAR (computer aided realisation). This field turns 3D geometry, essentially cartesian mathematics, into what initially looks like pretty pictures!

CAR produces stills or animation, portraying an object or scene so accurately, that sometimes it's almost 'photorealistic'. It provides a customer with a realistic picture or sprite of a product that might not even exist yet. Architects can light buildings that have never left the disc drive. Advertisers can send Smarties flying around classrooms and film directors can explode planets. The 'clothing' of a simple wireframe object with textures, reflections, refractions and shadows is called 'rendering'. However, high quality rendering is not enough to produce realism. Unfortunately, the famous adage, 'garbage in, garbage out' applies to computer graphics. No matter how accurate or photorealistic the renderer, a weak image will always appear unrealistic if the design is not sufficiently detailed. In this respect the design system of a CAD package is just as important as the rendering system.

Not surprisingly, the Archimedes is being exploited for its speed and graphics capabilities and CAD/CAR packages are relatively inexpensive. If you are interested in CAD/CAR and are attempting to decide between the Archimedes and other computers, hardware comparisons can be argued till superconductors work at room temperature! However, an indisputable fact concerning Archimedes CAD packages – and in fact most 'professional' Archimedes packages – is that they are far less expensive than their PC and Macintosh counterparts. For anyone interested in buying a complete CAD system, with no reason for PC compatibility, the Archimedes should be a very serious consideration.

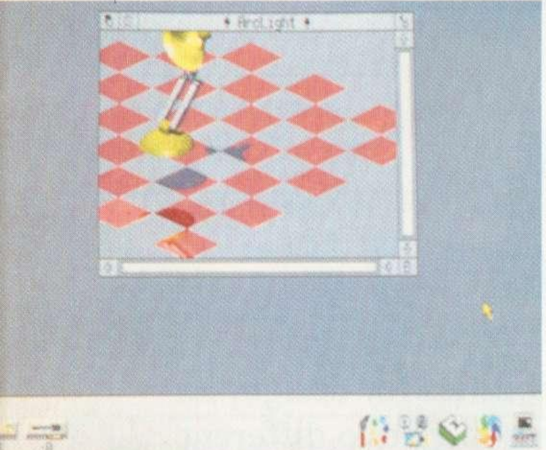
Two of the major contenders in the Archimedes CAD/CAR world are Ace Computing and Clares Micro Supplies. Clares has followed *RenderBender* with *Illusionist*, a sophisticated smooth shader. Ace Computing has added *Arclight*, a



Euclid's single-window design area

multi-tasking raytracer, to the existing *Euclid* and *Mogul*. Both companies have now taken the wise step of making their CAD packages totally Risc OS compatible. This ensures that, within the Archimedes environment, most users will experience little difficulty coping with the user interface.

However, the packages are fundamentally different. *Euclid* is a design system with a fair rendering capability. This rendering, as illustrated, is facetular shading. Each side, or facet, is not blended into the next facet, resulting in a 'crystal-cut' appearance. Certain objects, such as buildings, can benefit from this rendering. Others, such as spheres, tend to look unrealistic unless a vast number of facets are used. In general, the more facets, the slower the rendering and the larger the image data. Ace Computing's new release, *Arclight*, improves the final image by allowing comparatively fast raytracing of existing *Euclid* designs. *Arclight* and *Euclid* are separate programs, although the method of data transfer is so easy they can be considered as a whole (such is the pleasure of Risc OS!).



A Euclid scene rendered by Arclight

Illusionist works in conjunction with its renderer, a very realistic smooth shader. It portrays shadows, highlights and even texture maps, but the method used is not raytracing. Raytracing is a very complex and time-consuming process. The result is generally very impressive, but it can exceed certain user requirements.

Both systems use a very friendly, simplified CAD design main screen. Both also have manuals aimed at the non-CAD user, so the documentation is littered with examples and useful tips. Unfortunately, users of professional CAD packages will be disappointed. Both packages are adequate for school and home use, but neither allows sufficient detail and precision in designing. The packages also fall down by not allowing any CAD data to be used from other PC CAD packages, or data to be output to any other professional package. The rendering of *Illusionist* is generally better value for time.

For the first-time CAD user, designing in either package will not come easily. Having to think in three separate dimensions can be a shock to most brains. *Euclid* uses an interesting one window design viewport as opposed to the accepted three projections (plan, front, and side) that *Illusionist* and professional CAD packages use. This one window system aids object design initially and will generally be more than adequate for most objects. As the complexity of the objects and scene increases, designing can be rather cumbersome and non-precise. *Illusionist*, by using the three viewport system provides an easier way of placing and orientating objects accurately. Both of the systems are driven by either a menu system or by a set of somewhat indecipherable icons.

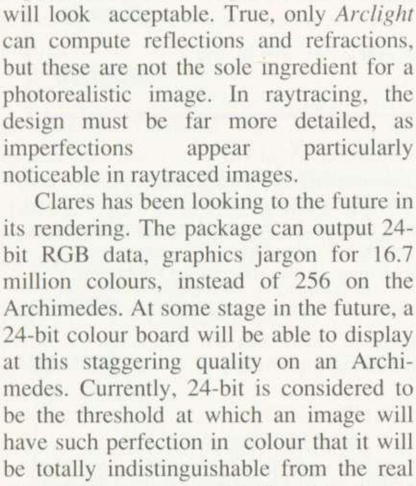
The basic CAD tools are present in both packages. Sweeps are used to produce a circular shape. A simple line swept around a mid-point can form a cylinder. A circle swept around its middle will model a sphere. *Euclid* allows far more accuracy in this operation and a greater control over how the sweep will appear when rendered. Within *Illusionist*, a small window opens to reveal a grid on which the sweep profile is drawn. Even the addition of a numbering system on the grid would have improved the accuracy which can be attained. However, without co-ordinates, the rubber band outline drawn is very arbitrary, therefore swept objects that require reasonable detail can be impossible to draw. This is a pity, as the simplest feature in CAD should be the sweep, but the frustration in sweeping within *Illusionist* tends to indicate otherwise. As well as the extrusion facility that both packages have, *Euclid* boasts a sheet option, a simplified parametric modeller. This is where a curve between two lines can be created. Sheets are useful and interestingly, in professional markets are rare, expensive and sought after. The most readily available example of a 'sheet' is a horse saddle. Within most CAD packages, and certainly within *Illusionist*, a saddle would be extremely difficult, if not impossible to design. It has been suggested that a saddle could be created within as few as four steps within *Euclid*. Teapots are within your grasp in minutes rather than hours!

Ace Computing's *Mogul* allows a *Euclid* design to be animated easily. This animated film can contain movements of any of the objects and rotations around any axis. This motion is achieved by specifying points which the object must pass through. The spectacular and complex films that can be produced could lead onlookers into assuming that they are difficult to make. On the contrary, for all but the most elaborate animations, the *Projector* program can cope with the display and *Mogul* with the design. Sprites can be used as backdrops and the film is automatically compressed to decrease its final size. While *Illusionist* offers no animation facilities, it still serves a vital purpose in CAR. All the pictures in this feature are motionless – in fact most CAD work ends up as still shots. The need to animate is a personal choice and there are packages purely for the animation of sprites. Aesthetically, it is great to be able to have *Euclid* designs spinning around in windows on the desktop, but in reality this has few commercial uses.

At the end of the day, the final image is what matters and neither package will disappoint. However, image quality is fundamentally subjective. Bearing this in mind, I consider that the raytracing by *Arclight* is not of a quality high enough to justify the time spent waiting for the final rendering. Raytracing has become an over-

used computer buzzword and an over-used process. It is incredibly computer intensive, and unless the algorithms for dithering (colour mixing to approximate more colours than the computer has) are particularly advanced, or the computer uses an expanded colour board (allowing more colours from the computer), the results can be very coarse. Smooth shading (as with *Illusionist*) will always appear impressive on the computer. It is alleged that smooth shaders 'know their limitations' and therefore do not stretch the capabilities of the computer beyond what will look acceptable. True, only *Arclight* can compute reflections and refractions, but these are not the sole ingredient for a photorealistic image. In raytracing, the design must be far more detailed, as imperfections appear particularly noticeable in raytraced images.

Clares has been looking to the future in its rendering. The package can output 24-bit RGB data, graphics jargon for 16.7 million colours, instead of 256 on the Archimedes. At some stage in the future, a 24-bit colour board will be able to display at this staggering quality on an Archimedes. Currently, 24-bit is considered to be the threshold at which an image will have such perfection in colour that it will be totally indistinguishable from the real object. When a cheap 24-bit colour board becomes available for the Archimedes, *Illusionist* will become a truly powerful package with very few price contenders in the other computer markets. *Arclight* has no such facilities, but no doubt Tony Cheal at Ace Computing would consider adding the ability for 24-bit data output should a board be available.



Sweeping out objects in Illusionist

On a less serious side, hobbyists will enjoy using both packages: they are easy to use, and documentation is more than adequate. The design environment is friendly but perhaps a little too iconated in both. For the user who fundamentally wants a quick, well rendered image of their CAD work and is not interested in animations or high quality raytracing, *Illusionist* must be a wise buy. For those who are interested in CAD as a means of producing animations or drawfiles and perhaps dabbling in some time-consuming raytracing, *Euclid* and the animation package, *Mogul*, will more than fulfil needs. However, it should be noted that even the larger computer graphic houses try to avoid raytracing when possible.

Euclid does have the major advantage of being totally integrated within the Archimedes world. *Mogul* films can be used in *Genesis*; *Euclid* pictures can be saved as drawfiles and the objects can be created partially within *!Draw*. *Arclight* is totally multi-tasking. In this respect, schools should certainly look at *Euclid* and its related packages as a kernel for CAD work. The Risc OS interface in both packages is commendable, and certainly will help to break down any initial barriers between users and CAD.

Clive Gringras

Solidcad

I reviewed *SolidCad* in *BAU* two years ago, in its pre-Risc OS incarnation. The user interface remains mainly non-Risc OS, although the design is compliant with the industry-standard interfaces present on PC CAD packages, like *Generic CADD* and *AutoCad*.

A Risc OS front end has been added to version 4 (a *SolidCad* icon resides on the icon bar) even though all editing has to be effected within *SolidCad*'s own environment, which consists of the traditional four-window elevation projections (plan, side, front, 3D) covering most of the screen, with menus presented on the far right. The multiple views can be in either first- or third-angle format and any projec-



Illusionist took under five minutes to render this cup

tion window can be enlarged, covering the other three, simply by clicking the right mouse button in the required elevation. The editing features in *SolidCad v4* remain on the sparser side. All objects have to be constructed using either facets or outlines; facets are used to construct polygons of any shape and outlines provide the Sweep and Extrude tools with profiles of shapes.

Objects and editing

Sweep can take an outline and rotate it around either the x,y or z axis. This enables the creation of objects like toruses and cylinders, or even spheres if you have the patience to draw the outline.

Extrude lets the designer 'stretch' an outline along any axis, so another way of constructing a cylinder would be to outline a circle then Extrude that. The objects that Sweep and Extrude leave behind are all constructed of facets. The coarseness of the object depends on how many facets there are in any given 'segment', which can be pre-defined (for example, if I wanted a half torus with a high resolution, I would type: SWEEP 1,180, then outline the square profile of the object. The sweep

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Wild Vision is the leading company specialising in the design and manufacture of expansion cards for the Archimedes and A3000. The Company has special expertise in the field of video, and many of the cards act as interfaces between computers and video for various applications. A custom design and manufacturing service is offered for specialist applications.

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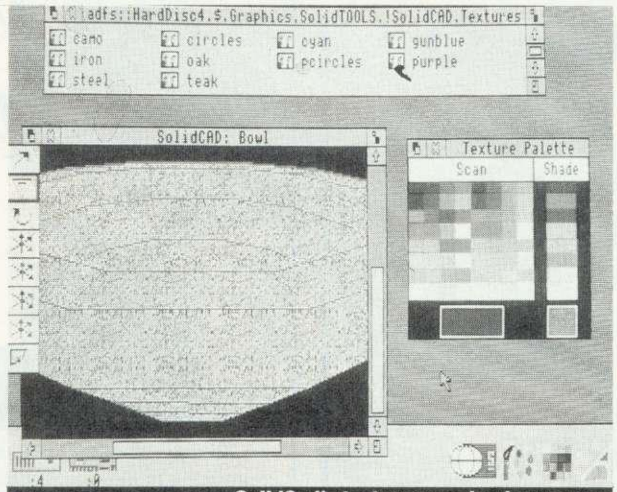
Products available from Wild Vision or good Acorn Dealers.

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VAT @ 15% and delivery charges excluded from above prices. Delivery charges in UK are £5 per unit for all expansion cards and £2 per unit for all software.

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SolidCad's texture mapping in progress

command essentially means construct a new 'segment' every one degree throughout the entire 180 degrees the sweep will cover.)

There are no bezier curves within *SolidCad* and no primitives like spheres, cubes, etc. These omissions are certainly not minor and do limit the usefulness of the software as finer detail means greater memory consumption, and thus slower update/redraw times. As to changing the design once finished, a limited number of tools are at your disposal. These include selecting a vertex of a facet and moving it, selecting an entire facet and moving or changing that, or selecting an entire region of the design and altering that.

Facets, or polygons, do have their advantages. *SolidCad* can render your design in a variety of ways, from simple wireframe to smooth shading. The smooth shading uses a Phong/Gouraud-derived technique which is algorithmically based on polygons.

SolidCad images are generated internally to a high resolution, and an option is given to make use of this capacity and generate images to a greater quality than simply 'shading'.

SolidCad can also render the facets of objects in different ways, depending on which facets are given priority for display.

Texture mapping

Apart from the new Risc OS front-end and faster drawing/update times (instead of the old Basic/assembler mix, it's now C/assembler) the software now has a major new feature: texture mapping. A 'wooden' floor no longer needs to look like it's been constructed from linear shades of brown, but a 'real' wood finish can be applied.

The illustration on this page shows a bowl I designed, using *SolidCad* to apply a 'stone' texture to it. The application of textures is simply done and is the only thing that benefits from the Risc OS front-end (indeed, it cannot be done within *SolidCad*'s own environment). Combined with light source shading (up to 26 different light sources), texture mapping results in great images without having to resort to raytracing. The future for *SolidCad* is as a conceptual design tool. Even though it lacks in some areas, it is a fully-fledged CAD package which means that it will be able to have its output (your designs) analysed by volumetric and stress analysers for example.

Volumetric analysis enables the designer to see exactly how much space will be consumed; stress analysis shows the physical weak and strong points of the design (mostly as colour-coded contours). Silicon Vision is co-operating with the producers of *LinCad* (a 2D draughting program) so that elevations can be shared between the programs. As a result of early collaboration, a release is imminent.

Additionally, *!Draw*-format files can be utilised, further enhancing the appeal of the software.

The manual supplied is very good; examples and brief questions are used throughout. For the professional user, *SolidCad v4* is a good – and future-proof – choice.

SolidsRender

Especially with texture-mapping, *SolidCad*'s output is easier to relate to the real world. But for the ultimate in realism, nothing can beat raytracing. So, Silicon Vision has extended its range of design tools by releasing *SolidsRender*, a raytracer now included in the *SolidTools* range.

Raytracing is a technique used to generate images which portray 3D designs as realistically as possible – for example, mirrors that really reflect, or water that really refracts.

As the name implies, these images are obtained by following the paths of light, specifically those that enter the eye through pixels on the screen. The computer has to calculate which objects are struck by the ray, taking into account their material properties (how much they shine, let light through or reflect light, their colours, sizes and shapes) to decide which, if any, direction the ray then follows.

Water, for example, both reflects and refracts light, so for one ray striking the water at least two are generated.

SolidsRender is intended as a photorealistic image platform for *SolidCad*. To this end, it has only one primitive – a sphere – with the design of a scene placed firmly in *SolidCad*'s court. *FilmMaker* paths can also be imported, allowing the generation of animated scenes automatically. *SolidsRender* gives the user a huge range of material property specifiers, selected within an environment similar to *SolidCad*. The four windows are present along with the menus on the right. At the bottom of the screen is the 256-colour palette shown as tiny rectangular blocks, which could be bigger to ease selection. Also displayed at the bottom is a Help message, relevant to whichever menu item the pointer is currently indicating. This is a nice feature, sadly absent from *SolidCad*.

Material specification

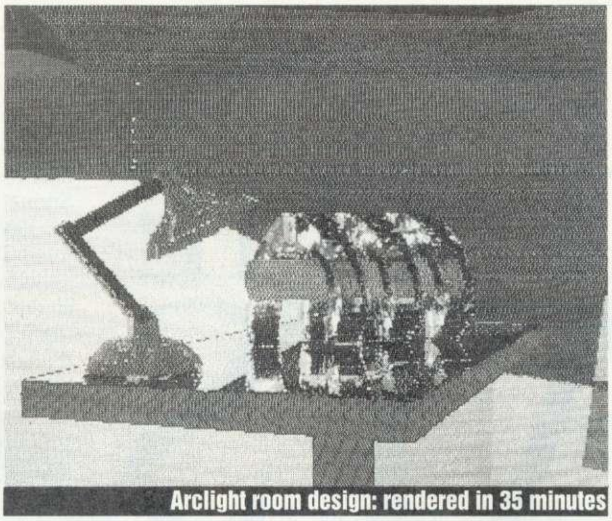
All objects within the program can have their specular (shiny), diffuse (matt) and ambient (original object) colours specified separately. So you could have a turquoise ball which emits a pink matt contribution, but green highlight spots. Additionally, these colours can be added to the object's original (*SolidCad*) colour, which itself can be scaled for specular, ambient and diffuse contributions.

Objects can be made reflective, transparent and shiny according to the appropriate coefficients. The specularity (shininess) of an object can be changed from pinpoint highlights to broad spread highlights. The object can be totally reflective (when its reflective coefficient equals 1) or transparent.

The amount of refraction the object gives (the refractive index determines how much light bends on entering the object) can be altered, from 1 for air to 1.3 for crystal, to anything that takes your fancy. As if this weren't enough, the program lets you specify exactly how transparent an object is, and whether the red, green or blue components of the light change during the process.

For example, an object could have white light going in but only yellow light coming out.

As *SolidCad* texture maps, so does *SolidsRender*, only far better. *SolidsRender* can take any sprite (as long as your



Arclight room design: rendered in 35 minutes

machine has enough memory) and map it onto any object – with perspective taken into account, sprites can be treated in an alternative manner. Rather than simply 'painting' a surface with a sprite, *SolidsRender* provides the user with the ability to apply different material properties to the object.

Depending on whether the bitmap is on or off at the intersected point, an object can present two properties (known to *SolidsRender* as layers 1 and 2). An object could then block light or let it pass according to the design of the bitmap. Any of the specifiers detailed above can be changed in each layer, leading to extremely complex designs. Texture bitmaps and sprites can also be scaled in two dimensions.

Obviously, to see the scene, you need a viewpoint. *SolidsRender*, as in *SolidCad*, allows the user to place a camera at any position within the scene, pointing in any direction.

The zoom level can be changed, as well as the x,y and z scaling of the 3D projection of the scene.

Lighting

SolidsRender can detect up to 26 light sources, and each can have its own colour, radiosity (how penetrating, or bright, the light is with distance), and a cut-off point (below a certain 'brightness' the ray will no longer be traced). Any of the lights can follow an imported *FilmMaker* path, enhancing the animation prospects for the software.

I'll say something here about colour and the Archimedes. When the Arc was launched, much was made of its ability to display 256 colours at any one time from a palette of 4096. However, a restriction exists on how those 256 can access the full palette (the 256 is essentially 64 colours at four brightness levels).

Modern graphics workstations have the ability to display 24 bits' worth of colour (eight bits per red, green and blue component – almost up to real visual standard) or 32 bits (real life isn't more real!). That's up to 43,000 million colours.

In anticipation of similar graphics technology appearing for the Arc (for example podule-based graphics co-processor), Silicon Vision's colour routines within *SolidsRender* calculate to 192 bits, or 64 bits for each RGB component.

Then, using a very impressive colour mixing and dithering algorithm, this is reduced to the Arc's 256-colour palette. Apparently, that colour algorithm alone took several months to perfect.

Special effects

SolidsRender provides excellent control over the output of the final image. The program can be told not to bother following the reflections from objects with that capability. Similarly texture-mapping can be disabled as with the tracing of transparent objects. Shadows can either be computed or left untraced. To enhance the image still further, a supersampling option is provided.

Supersampling is a method which involves rendering the image at a greater resolution than the display. This image is then averaged out thus: the pixel to be finally displayed is compared with its immediate neighbours in the higher-resolution image; it's then 'averaged' according to the values those adjacent pixels possess.

This technique greatly reduces an effect called 'mach-banding', the bane of many renderers – two adjacent shades of (mostly) the same colour play a visual trick, in that the eye seems to think the shades darken towards the join. It's also known as 'pillaring'. If you visualise a Roman column look, you'll get a better idea.

A 'telephoto' effect can also be applied, by specifying the angle of vision both horizontally and vertically. As ray-tracing is naturally recursive, a depth variable exists to limit the extent of recursion in the renderer. The overall radiosity of the image can be altered too (letting you change the brightness of the image).

And, finally, the image can be rendered in sizes from one to eight doubling through to the entire screen. The completed image can be saved in either the internal high-resolution 'RGB' format or a standard sprite file.If the former option is taken, a separate option, Process, has been supplied which effects the superb colour mixing and error-diffusion algorithms on the RGB files.

This option can take specifiers allowing, for example, the generation of a grey-scale image or the use of different error diffusion techniques. Output can either be another RGB file or a sprite file. (The option is the same as the one used within *SolidCad*)

SolidsRender is not a program for the casual user; it's an extension of the *SolidTools* range and as such is intended for the professional CAD market. Unfortunately, as it relies on *SolidCad* as its primary scene description tool, I can't say that the only limit is your imagination, as *SolidCad* is the limiter here; designs are constructed entirely from polygons and a complex scene could involve drawing thousands of the things.

To describe a scene for use with *SolidsRender* with *SolidCad*, each object must be described and saved separately, as *SolidsRender* imports and treats each *SolidCad* design as just one object. With ray tracing being inherently slow, such designs can take a very long time to render. For example, one very simple design took me six hours!

However, Silicon Vision promises faster algorithms in the 'near future' as well as the possibi wlity of bezier curve implementation, so things aren't too bad. At the moment, however, *SolidsRender* still gives some incredible images considering the machine display limitations.

The manual is reasonable, although it would benefit from the inclusion of some examples.

Conclusion

I am happy to say that I'm not caught in any quandary here; each suite of programs is aimed at distinct, and separate, markets. *SolidCad* and the stupendous *SolidsRender* come cheap to complete a professional system in the form of *SolidTools*.

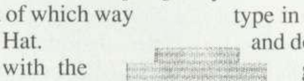
And the wonderful *Euclid* with *Arclight* is unsurpassed for the home/hobbyist user. I'd certainly be happy to use either of them.

DRAT THE HATS

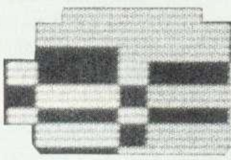
BRYAN B CLOUD takes us further into the world of the Pygmoids in the game that could save their lives

I have some good news and some bad news. The bad news is that things aren't looking good for the Pygmoids; the Hyperspatial Anti-matter Tachyons are still threatening to tear the very fabric of space into tatters and take the world of Pygmion with them. More Hats are appearing as I speak and I've just heard that Hats have been detected in three more regions – the sooner you can master control of the Self Propelled, Rebounding, Indestructible, Nullifying Gyroscope the better!

The good news is that a team of scientists at the Pygchester Institute for Scientific Studies have been researching the Hats as they appear and have found that they emit a very subtle and unique form of radiation. It is this radiation that causes them to become unstable and implode. Unfortunately no method of regulating these emissions has yet been discovered, but the scientists have developed the 'Computerised Location Update Equipment' – a unit capable of detecting and indicating the location of the nearest radioactive source. The 'Clue' has been installed in the 'Spring' and gives you some idea of which way to go to find the nearest Hat.

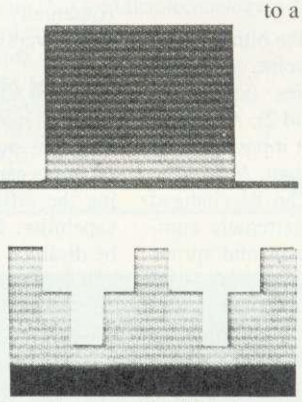


The only problems with the Clue at the moment is that it needs someone to operate it (this means it only functions when the Spring is stationary) and it takes a while to locate the Hats. The actual time is proportional to the amount of time left before the Hats implode. The same team of scientists has also found that when a Hat is nullified the radiation level drops quite dramatically, giving you some extra time to play with – let's hope it's enough!



Typing in the game

I have some more good news and some more bad news. The bad news is that there you'll need to type in eight listings, seven of machine code and one with 140 lines of data. The good news is you can buy the monthly disc which contains the fully working game ready for you to play.



If you want to type the game in, then carefully enter all eight listings (Hat0 to Hat6 and Create) and save them. The game assembles in sections and a (fairly) cunning system is used to transfer the variables between them. My thanks go to Chris Ruseman for showing me how to do this! The 'Create' program must be run first as this creates six datafiles that are subsequently 'imported' into the game as it assembles. While running, 'Create' keeps you informed of what file it is creating and how many bytes it has left to save. If you have made any errors in typing in the data, the program will inform you of the offending line. Make sure you type in the program exactly line for line and don't renumber it, otherwise it will get the line number wrong!

Once the six files have been saved, you can run 'Hat0'. This sets up all the variables for the game and then automatically chains the rest of the 'Hat' programs which assemble the actual game. The final program, 'Hat6' performs various checksums on the code and if it is all correct saves the final game as *HatTrix*. And that's all there is to it. Wouldn't you rather buy the monthly disc?

Playing the game

However you get hold of the game, it can be run simply by typing *HatTrix. This will display the highscore table and invite you to press SPACE to start the game. The principle of the game is unchanged since last month's demo – use Z and X to move the Spring left and right. The longer the keys are held down, the higher the Spring will jump. The level number, screen number (1-4) and number of Hats to collect is shown at the start of each screen. You have a limited time (shown graphically as a bar at the bottom of the screen) in which to nullify the Hats randomly scattered throughout the four playing areas. Hats are nullified simply by crashing into them: you'll get five points for doing this and some extra time. After nullifying the last Hat on a level and coming to rest, any time left is added to your score as a bonus.

The output from the Clue (see above) is shown as a simple arrow in the bottom left-hand corner of the screen. You'll be able to hear it scanning for Hats and point in the rough direction of the nearest one when it has found one. The display changes to a diamond when the Spring is preparing to jump, as none of the Pygmoid crew can be spared to operate it! Remember that the more time you have left, the longer the Clue will take to find the Hats.

As the amount of time left falls, the radiation from the Hats increases to such a point that the containment fields placed around them become unstable and flash rapidly. Just before the Hats implode they disappear completely. If you don't nullify a Hat almost instantly and reduce the radiation level, all the Hats will implode, the Pygmoids, Pygmion and Pygmingham University will be obliterated from existence. You'll be informed of this fate by the most evil Pygmoid curse being placed on you and those accursed words 'Game Over' appearing. But don't forget it's only a game, so you can always press SPACE for another go!

In addition to Z and X, you can pause and unpause the game with COPY and DELETE, switch the sound on and off with S and Q and more importantly scroll the screen around the Spring with the cursor keys. Oh yes, CTRL-ESCAPE will quit the game and return you to the highscore table.

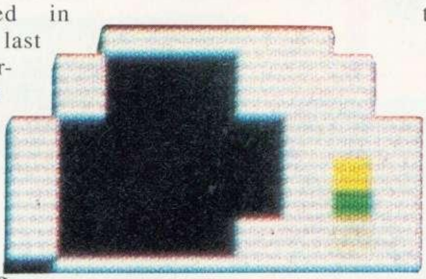
One final point, after four levels you'll get a bonus level. This is simply a practice round with a set time limit of two minutes in which to get as many Hats as you can. You'll get 20 points for each Hat, but no extra time, and as it is only a practice level, you don't die when you run out of time.

I think that's all you need to know to play the game. The rest of this article is all about the changes since the demo version

and how some of the more interesting bits of the code work, so don't feel obliged to read it now. In two months time, I'll finish off with the screen designer and some ideas on how to write your own games.



Many new features have appeared in *HatTrix* since last month's demo version. To make it a real game, levels of increasing difficulty were added. Each level has four screens, bonus levels occurring every five screens. The number of Hats to collect begins at four and increases by one each screen. The number of Hats displayed at any one time is eight for the first screen of a level, seven for the second and so on. The time you have at the start of a screen begins at 60 and goes down by five per level to a minimum of 30. The amount of extra time given after collecting a Hat starts at 30 and decreases by two per level to a minimum of 18. Additionally, extra time goes down by two per Hat collected on a screen to a minimum of 14. Incidentally, one unit of time is a little longer than a second. The routine .nextlevel in Hat2 deals with all these parameters. In bonus levels, the number of Hats to collect is 255 with eight shown on the screen, initial time of 120 and no extra time per Hat collected.



A high score table has been added, but because mode 2 is only 20 characters wide, a special 6x8 pixel character set is used for names, scores and messages. These are plotted by .putc in Hat5. These are stored in compacted form and shown in the chosen colour using a mask stored in tcol.

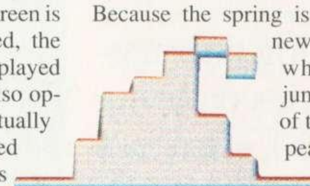
Some platform types are bouncier than others. Figure 1 illustrates this, with the blue 'ice blocks' being the trickiest to land on. You'll also notice that the platforms have been redesigned since the demo version. I found the original designs a bit too 'loud' to work in chunky mode 2!

HatTrix relies much upon fast screen scrolling. So called 'hardware' scrolling is used – altering registers in the display chip to enable the screen to be moved left, right, up or down instantly. Having shifted the screen, the new edge revealed has to be redrawn as quickly as possible. The routines responsible (.redrawbottomedge, etc) are found in Hat3. Where possible, the code is in 'expanded' form for speed. That is, rather than have a loop to put eight bytes of sprite on the screen, eight identical sets of instructions are used so that branches needn't be made. When the spring is falling rapidly, up to 512 bytes of screen memory need to be updated each fiftieth of a second, so speed is essential. As a rule, vertical scrolling has priority over horizontal scrolling. However, additional scrolling is provided in 'emergencies'. In such cases, the Spring is close to both the side and the top or bottom of the screen and scrolling occurs in both directions to cure the problem. The machine isn't fast enough to do this very smoothly, but it only happens rarely.

Because the screen is hardware scrolled, the time bar and score need to be displayed every frame. So these routines are also optimised for speed. The score is actually plotted elsewhere and block-copied onto the screen each frame. Routines to show the time bar have been 'expanded' like those to redraw the edges for maximum speed.

With so much going on, it is important that things are done in the right order. An *FX 19 is issued to wait for the computer to start displaying a frame. After this, you know that the electron beam in the monitor is at the top left corner and you have to move rapidly to get everything done in the next fiftieth of a second. Scrolling routines are divided into pairs. For each direction there is a routine to change the start-of-screen address and another to redraw the appropriate edge. The first routine is called immediately after the *FX 19. Next, if necessary, the old spring image is blanked out. When the spring is standing or crouching ready to jump, it isn't necessary to blank the old image and this provides valuable extra microseconds to draw the power meter and clue.

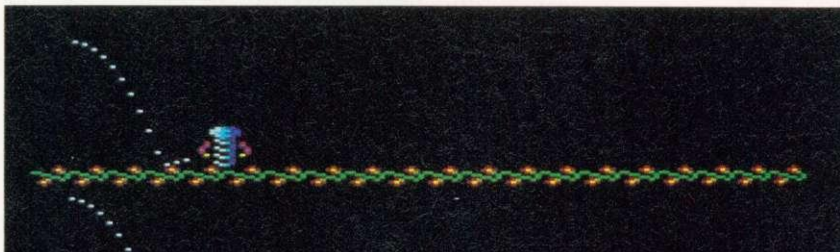
Next the spring is shown in its new position. Because this is the focal point of the game, it is important that it flickers less than anything else. Hence, blanking and replotting must be as close together as possible. Then the newly revealed area of screen is plotted and finally the time bar and score are shown. These are at the bottom of the screen, so can be displayed last.



One further refinement of code was needed to make scrolling upwards prettier. Because the spring is shown before any new piece of scenery, when the spring jumped beyond the top of the screen 'junk' appeared briefly on the exposed top line (usually another copy of the time bar). To cure this, the screen is actually 33 character lines high. You never see the top line unless scrolling vertically when it appears momentarily. This is possible because the screen has been 'shrunk' horizontally and so there is spare screen memory hidden away.

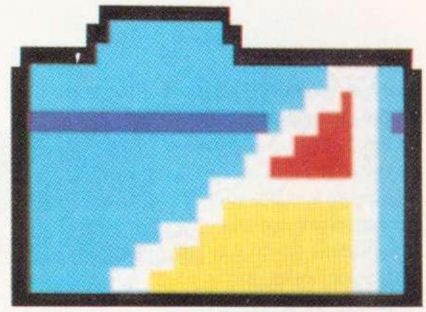


Remember to look out for the *HatTrix* screen designer in a couple of months. In the meantime, happy hat-collecting...



Hope springs eternal in the Pygmoid breast...

THE NEXT STEP



Continuing our step-by-step series on using the A3000, **DAVE FUTCHER** explains how to back up discs and files, and how to set up discs to store your own data

It is best to avoid using the application discs or program discs that you were supplied with when you purchased your A3000, or any others that you buy afterwards. You should make copies of them and then store the originals away safely. This is called making a back-up.

To buy your discs pop down to your local dealer or order them from one of our advertisers. You will need 3.5-inch double sided/double density (DD/DD) discs. Buy at least 20 and, if you like, format them all to save you time later on.

Data is stored on a disc by magnetising small areas, just like a music tape. Although this method is reliable under normal circumstances, you may accidentally leave the disc on top of something which is magnetic itself, like a television or loudspeaker. This may erase part or all of the disc, rendering it unusable.

Backing up is done onto a blank formatted disc. The A3000 calls the orginal disc the *source disc* and the blank formatted disc you are going to make a backup on to the *destination disc*.

Move the pointer to the disc drive icon and click the Menu button. Now move up to the Backup menu item and click on select. A window will open with the message: 'Are you sure (Y/N)'.

You have to type Y or click the Select button. A further message appears prompting you to 'write protect' the source disc.

All discs have a small tab in the bottom corner. This tab tells the computer whether or not the disc can be written to. To write protect a disc, slide the tab so that you *can* see through the hole. Now when you insert the disc in the drive, the hole will tell the computer this disc is protected. It's best to write protect the source disc because if you are going to swap between discs then there is a danger of mixing them up and destroying both of them.

Insert the source disc in the drive and press the Space bar. The computer will load data from the source disc. You'll then be asked to replace the source disc with the destination disc. Do this and press the Space bar again. Now the data that was read from the source disc will be put on the destination disc.

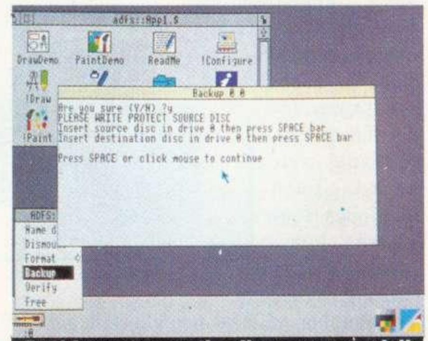
During the back up process, you'll be asked to swap discs again as the computer copies a part of the source at a time.

You now have a backup copy of your program disc ready for use, so label it and store the original away in a safe place away from magnetic fields and heat. Do remember to make backup copies of both the Application discs and the other program discs that came with your A3000. Do it now: better safe than without your *!System* folder!

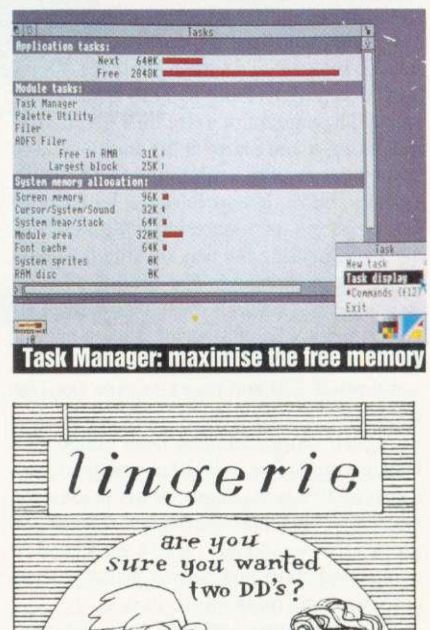
Most discs allow you to back them up. However, some may not: games are generally 'protected' to prevent people giving copies to their friends. Read the manuals for each application that you buy and most will say that you are allowed to make a backup copy for personal use.

Now you've done it the proper way I shall introduce a much quicker way. Your A3000 has at least a megabyte of memory and a disc stores only 800K, so why does the computer not do it all in one go?

This is the perfect opportunity to introduce you to the Task Manager, the application that allows you to specify how the memory in your machine is shared out.



Backing up: swap the discs over carefully



Task Manager: maximise the free memory



CARTOONS BY SIMON REES

Click Menu over the Archimedes icon in the bottom right of the screen and select the Task Display menu item. A window will pop up. Make it fill the whole screen by clicking on the Toggle Size icon.

The first two bars are the Next and Free memory bars. Whenever you run an application, it will take memory from the Next bar. Its name will appear alongside a new bar showing how much memory it uses.

Now set the Free bar to maximum by clicking on it and dragging it as far right as possible. You will need to set it to 800K or as close as you can get. This free memory is used to hold the data being transferred. For instance, if 100K were free, you would need to swap the disc eight times. If it is about 800K, you will only need one or two swaps for each disc.

Close the Task Manager and back up the rest of your discs the quick way.

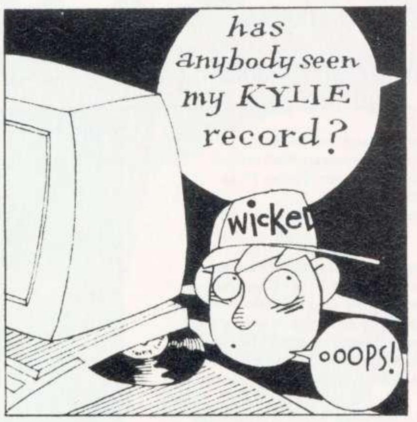
Copying files

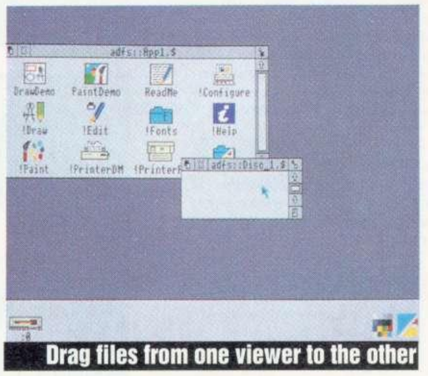
We now know how to backup a whole disc of programs, but you also need to learn some other copying techniques. If you use *Genesis* to develop an address database, create a picture with *!Paint* or write some letters with *First Word Plus* you need to make copy of your files in case the disc they are on gets damaged. This is really another type of backing up. But in this case you don't want to backup a whole disc, just a few files.

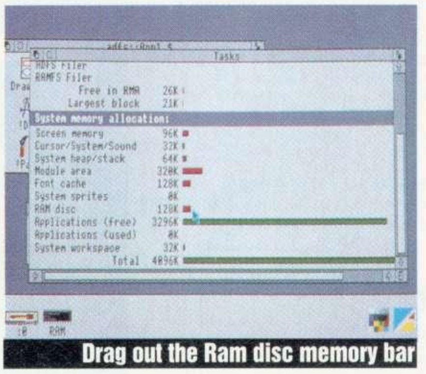
Once again set the Free bar to maximum and take Applications Disc 1 and bring up its directory viewer on the screen. Take a fresh disc and bring up its directory viewer as well by inserting it in the drive and clicking on the drive icon (if the disc won't fit, take the other one out first!). If you like, name this new disc by moving over the name sub-menu on the drive menu and typing in 'Disc_1'. After you have done this you will need to bring up the viewer again, with Disc_1 in the title bar.

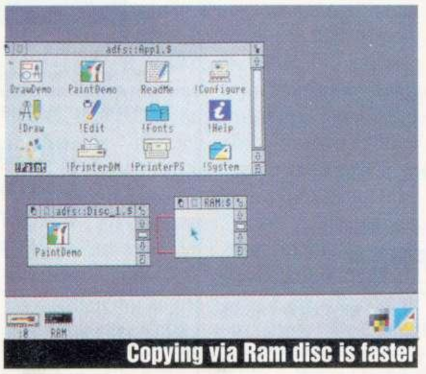
To copy a file, simply hold down Select over a file on the Application Disc 1 viewer (use the PaintDemo file in this case). A small flashing box will appear around it. If you now move the mouse, this box (a drag box) will move with it. It signifies that you have 'grabbed hold' of this file. If you now move the pointer over the Disc_1 directory viewer and let go of Select you are telling the computer to take this file and copy it to this disc. The computer will ask you to insert Appl, the Applications Disc. Do this and click on OK. Now you'll be asked to insert Disc_1: again click on OK when you have done this. The PaintDemo file will now appear on your Disc_1.

Your BBC A3000 has only got one disc drive, so copying files, applications or




Drag files from one viewer to the other


Drag out the Ram disc memory bar


Copying via Ram disc is faster

whole folders will require a large number of disc swaps. This can be very tiresome and can easily be avoided by using the Ram Filing System to create a Ram disc.

The Ram Filing System is just like a floppy disc, except that the data is held in the memory of your machine instead of the surface of a disc. You can specify how large your Ram disc is by bringing up the Task Display and clicking Select next to 'Ram Disc'. You can stretch out a bar telling the computer how much memory the Ram disc takes up.

With an unexpanded A3000, the size of Ram disc you will be able to set depends on other settings you have for other areas of memory. A Ram disc of 100K should do for now, because we are going to copy the *!Paint* application onto it and the application itself is only 75K long.

With the Ram disc set, click the Close icon at the top of the Task window. You should now see a Ram icon on the left side of the icon bar alongside the disc drive icon.

You are now ready to use the Ram disc for copying. Insert Application Disc 1 which contains the *!Paint* application. Click the disc drive icon to display the directory viewer on the screen. Now click the Ram icon. This will display an empty directory viewer on the screen.

'Grab' hold of the *!Paint* application, by holding down Select over it, and drag it to the Ram directory viewer.

Close the Application Disc 1 directory viewer and place your Disc_1 in the drive. Bring up its viewer. This time you wish to 'move' the *!Paint* application from the Ram disc to your Disc1 rather than copy it. To move a file, hold down either of the SHIFT keys and then grab hold of it. Drag *!Paint* to your Disc_1 viewer, keeping SHIFT pressed, and let go of the Select button. Now let go of the SHIFT key and *!Paint* will be moved on to your disc.

Resetting your computer

Sometimes when using your A3000 things will go wrong. It could be that the program you are running fails or you can't use the desktop or the keyboard. You may even need to clear out what is in the computer's memory or to reset the computer totally.

Of course you could switch the computer off to do this, but that is rather drastic! There are far better ways of resetting your computer and a number of keys that can help: ESC (Escape), CTRL (Control), BREAK and the Reset switch.

The mildest reset is to press ESCAPE: this is effective for exiting from routines that have gone wrong. Pressing ESCAPE does not really reset the computer, it just abandons the current operation if it can.

You could also try pressing BREAK. This will reset the computer, but it will

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '*' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

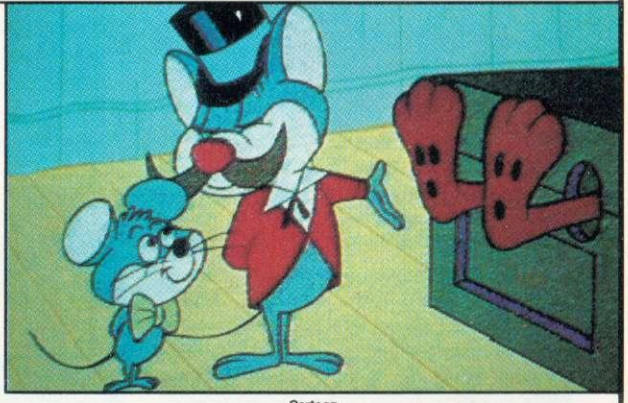
FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

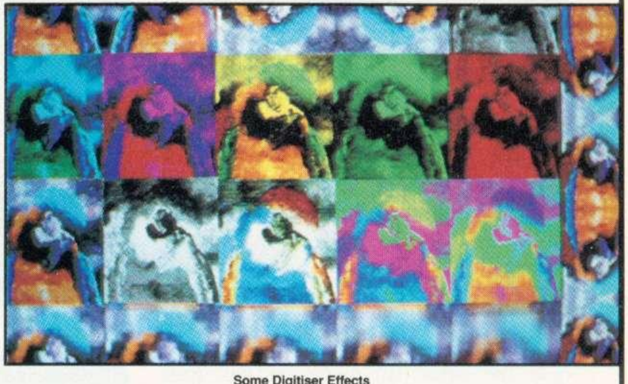
STOP PRESS! STOP PRESS! STOP PRESS! STOP PRESS! STOP PRESS! STOP PRESS!
Many new software applications are now supplied with the Digitiser including an excellent new icon based front end providing easy access to all the existing Digitiser features plus many new ones!



Cartoon



A Multi Picture Image



Some Digitiser Effects

-'Pineapple has produced one of the 'ultimate' Computer Video Digitisers'-
-'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes'-

Acorn User - April 90

NEW! NEW! NEW! NEW! NEW! PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder unit. This unit produces a full coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:

1. External to computer - no podule slots required
2. Sync regeneration to provide correct broad pulse and equalising pulse wfm
3. Switch selectable to 624 or 625 line operation - for interlaced or non-interlaced screen modes
4. Plugs into RGB computer socket and provides buffered output to feed Archimedes monitior + coded signal output
5. Adaptable for use with other computers or RGB and Sync signal sources.

PRICE £69.00 + VAT. P&P FREE

Digitiser Prices

Standard	£285.00
Extended	£315.00
A3000 Adapter Box	£65.00

POSTAGE AND PACKING FREE

NEW LOW PRICES! BBC PCB Designer NEW LOW PRICES!

This ever popular ROM based PCB designer is suitable for all BBC Micros.
It's fast high-density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' imput routine and allows any component to be 'picked-up' and moved around the board without having to re-specify component interconnection.
The full auto-route facilities are available even on a standard unexpanded Model B.
'PCB Autoroute is remarkable. No similar software comes near the price.'

Acorn User- Aug 88

PRICES

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Auto track routing	£85.00
Plotter Driver	£35.00

P&P FREE

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ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new * commands to the ADFS filing system as well as providing an extensive menu facility with over 35 sub commands covering such areas as repeated disc compaction, saving and loading Rom images, auto booting of files, and many more. Transferring of files from DFS to ADFS is also made very easy

ADU .... £29.00 P&P FREE

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RB2/115 Archimedes £45.00
RB2/107 Atari ST £45.00
RB2/109 Amiga.......................£45.00
RB2/110 Nimbus.......................£45.00
Mousetrak adapter to enable 101 and 101+ to work with Mouse software £8.00

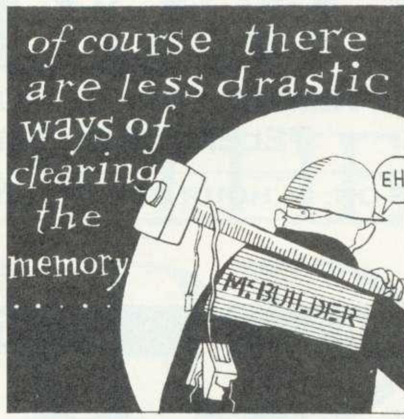
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Access



reset less of it than a 'hard break'. But you may find you will need a hard break so lets show you how to do that: hold down either of the CONTROL keys. Press and release the BREAK key, then release the CONTROL key.

An even severer form of reset is a hard reset. To do this hold down either of the CONTROL keys. Press and release the Reset button, then release the CONTROL key.

Making a graphics disc

Application Disc 1 contains a host of useful programs for the first-time A3000 user, but to get the best from them the programs need splitting onto various discs.

Say, for instance, that you want to use the A3000's graphics. I suggest you make a 'graphics disc' to hold the graphics programs and the paintings and drawings you create.

Starting from scratch you should format a new disc, and then copy the *!Draw* and *!Paint* applications on to it. Don't forget to use the Ram disc to speed things along. You should also make a copy of the *!Fonts* folder, and the printer driver that matches your printer. It is also worth copying the *!System* folder too, as that will save you having to insert the Application disc each time.

With copies of all these programs on the new disc, it's worth remembering to name the disc as you did before.

Once you start creating paintings and drawings, you will need to think about tidying up your disc so that there aren't lots of separate Draw and Paint files cluttering up the directory viewer. A good way of tidying things up is by creating two folders to store your paintings and drawings. You should call these DrawFiles and PaintFiles, and put your files in them.

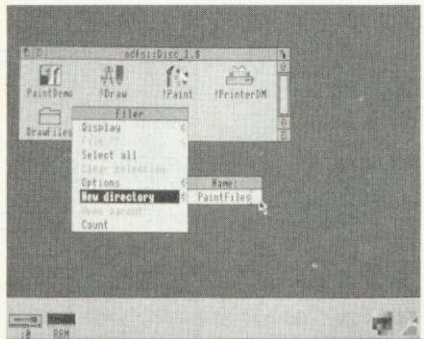
Making these new directories is easy. With your new graphics disc in the drive, click the Menu button on the mouse when you have the pointer inside the Directory Viewer. This will call up the Filer menu. Move the pointer down and over the New Directory sub-menu. This will bring up a dialogue box: when you type in a name, a new directory will be created. Do this for a DrawFiles and a PaintFiles directory.

If you or one of your family are musically minded or just want to experiment with the electronic music that the A3000 can make, it's worth creating a music disc too. This is accomplished in the same way as for the graphics disc.

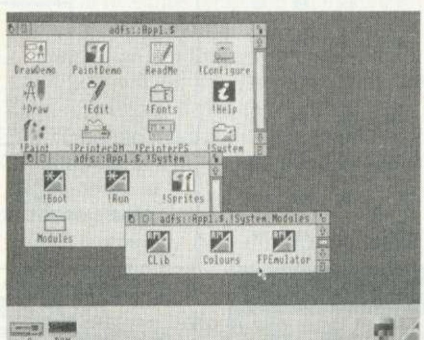
What is !System?

Have you noticed that the Application disc 1 that came with your new computer has a folder marked *!System*? Its appearance is rather different to the other folders, so what is it?

The *!System* folder is an application folder which is easily differentiated from standard folders as it has a special style of folder icon rather than the normal plain blue icon. *!System* contains the the 'system resources'. It is here that Risc OS expects to find the various relocatable modules which it needs to run programs.



Set up new folders on a graphics disc



Contents of !System and Modules folders

Double clicking the *!System* folder does not open the folder; instead this runs some special script programs (!Boot and !Run). To open the *!System* folder to see what's inside it, you have to press down the SHIFT key and double click the the *!System* icon at the same time. This will open up the folder and show files with names like !Run, !Boot and !Sprites. There will also be a sub-directory folder called Modules. To see what this contains, you can double click on it. If you examine the *!System* folder on Application Disc 1, you will find its contents are the Clib, Colours and FPEmulator modules.

CLib is the shared C library, which is needed by many applications. It appears in the Modules display as SharedCLibrary. Colours is a module called ColourTrans which is used to handle colour settings. FPEmulator is the floating-point maths system also needed by many programs.

Applications like *!Edit*, *!Draw* and *!Paint*, which are compiled C programs, need these system resources, and expect to find them in the *!System* folder and the Modules sub-directory. The application will normally check to see if the module has already been loaded, and if not, it will load what is required. The idea is that the use of *!System* and shared libraries prevents several copies of the same resources using up valuable memory space.

Many commercial applications include a copy of *!System* on the program disc. This is usually the case if a non-standard module is required such as ABCLib, the Dabs Press ABC Basic compiler library.

It can be a good idea to merge *!System* folders. To do this open a directory display containing each *!System* icon and drag the new one into the existing one. Risc OS will correctly merge the two folders.

But a point of caution! Some newer A3000 applications will only work with the latest versions of certain modules. For instance Colton Software's *Pipedream* needs version 3.5 of CLib rather than the version 1.2 supplied on Application Disc 1 Risc OS of course will notify the user is the wrong version of a module is available.

A word of warning if you do have copies of *!System* on various discs. The first time that you see the *!System* folder, Risc OS will remember which disc this was on. And if you subsequently load another application from a different disc (even one that contains its own *!System*), Risc OS will remember the whereabouts of *!System* and it will ask you to re-insert the original disc. That's why you're better off keeping one working copy of *!System* on what could be called your System Disc.

Leaving the desktop

Many people will find that they never need to leave the Desktop and use the Command Line mode. Others with specialist uses for their machine will use this facility a lot of the time.

There are a number of ways of leaving the Desktop. Probably the easiest is to press function key F12, which brings up the star prompt and Command Line mode.

Another way is to use the Task Manager on the bottom right of the screen. You simply click the icon with the Menu button and choose star commands from the menu (the menu also reminds you that you can use F12). From command line mode, you can type in any normal star commands – try *MODULES, for example, to list the relocatable modules in your machine.

Returning to the Desktop afterwards could not be simpler: a couple of presses of the RETURN key will do it.

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BRIAN CLOUGH	BB/EL	6.99	7.99	N/A	MONOPOLY	BB	8.99	9.99	N/A
COLOSSUS BRIDGE 4	BB/EL	8.99	9.99	N/A	NEVRYON	BB	N/A	9.99	10.99
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ACROSS THE BOARD

CHRIS DRAGE outlines the role IT will play in the National Curriculum

Readers in Scotland, Northern Ireland and other countries please bear with me if, for yet another month, I concentrate on the National Curriculum in England and Wales. The pressures on teachers to deliver all aspects of this are immense and any help in delivering the IT components both now and through the coming years is needed!

It is for this reason that I have concentrated in recent issues on the Archimedes and BBC A3000, as this 32-bit technology is clearly the way forward for educational computing.

The technology orders reserve one whole attainment target for IT – AT5 (Information Technology Capability). Here and in the relevant programmes of study, IT capability is evaluated in terms of: use of computer, wordprocessing, data handling, Logo, spreadsheets, DTP, art/graphics software, CAD, control technology, data logging and to a lesser extent, adventures, simulations and music software.

It takes a developmental approach, emphasising a progression of skills in the following areas:-

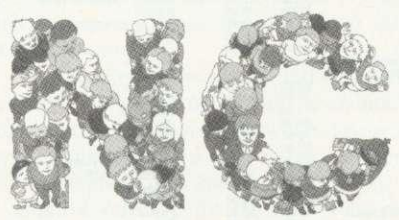
- communication (*BAU* Nov 90)
- information handling (*BAU* Dec 89/Jan 90)
- modelling
- measuring and control
- the application and the effects of IT

If the IT component of the National Technology Curriculum will have one major effect, it will be the removal of IT (the subject) from the timetable. IT will be placed firmly in every lesson – out of the lab and into the classroom.

Communication

Wordprocessing and presentation software were discussed in the Nov 90 issue of *BAU*, and since that time I have been able to evaluate *Impression 2* and *Junior* (Computer Concepts).

For straightforward wordprocessing and presentation, *Impression Junior* is the natural choice, especially at key stages 3-4 where it offers progression of DTP skills from *Pendown* (Longman Logotron) at key stage 2. It also provides an ideal launch pad for *Impression 2*, a professional software tool for key stage 4 and sixth form colleges.



If you require a wordprocessor with built-in numerical capabilities then *Pipedream* (Colton Software) is the natural choice as it is a spreadsheet in its own right and enjoys excellent real-time, graphing facilities with *Presenter* (Lingenuity).

Impression 2 is the only comprehensive DTP program for the Archimedes at the time of writing. It fits comfortably into a 1Mb machine and has so many page design features that it's head and shoulders above the competition.

Other presentation tools with a strong design flavour are *Poster* (4Mation Educational Resources) and *FontFX* (Datastore). The former program does to text what a potter does to a lump of clay – viz mould, fashion and distort text anywhere on the paper treating it as putty. Whether a school uses it for DTP effects or for making posters up to A2 in size (complete with cutting and pasting guides), *Poster* will not disappoint. A complex program, it is suitable for pupils at key stages 3-4.

For designing logos and interesting textual effects to include in desktop published work, *FontFX* is both simple to use and fun. Although not of *Poster*'s calibre, it does give an interesting and imaginative design aspect to presentation work.

A graphics library is a must for use in wordprocessed documents, DTP and multimedia applications like *Genesis*. *World Geography Maps* (Micro Studio) is the first of a number of graphics library packs.

There are 150 well drawn maps, each in *!Draw* format and as such can be coloured or scaled as desired and included in virtually any Arc application. Further titles include *Tools*, *History:Costumes*, *World Wildlife* and *Prehistoric Animals* packs.

Information handling

Archimedes' data handling software for young children is thin on the ground although if you have an A3000 fitted with the Pres A3K6/12 DFS, you can run (and print from) *Display Data* (Resource), *Data Show*, *Branch* and *Sort* (all Mesu) but not *Our Facts*. However, other Arc data handling programs for key stage 1 include *DIY Base* (Resource) and *Datasweet* (Kudlian Soft). The latter program offers a superb introduction to database management, spreadsheets and graphs, and to Risc OS itself. It presents all information in an uncluttered and attractive format.

Another data handling program designed with the National Curriculum in mind is *Dataking* (Shenley Software). Although it can be used at three different levels of operation to suit a wide age range it is probably best suited for children beginning key stage 2 and upwards.

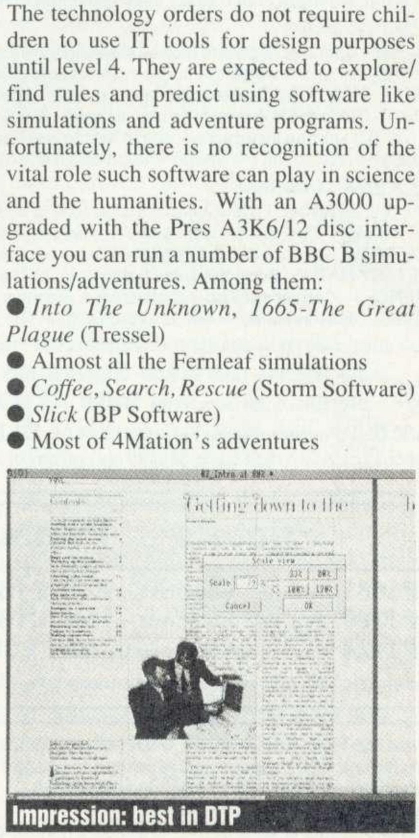
In the absence of a junior version of *Key Plus* (expected next year), *Dataking* fulfils all the requirements and as a bonus, runs on Econet. It includes a wide range of graphs and charts and the ability to print labels.

Although the history orders are not finalised, keep in mind three excellent historical datafiles for interrogation from Resource – *Castle Pack*, *Cateby Manor* and *Forge*.

Modelling

The technology orders do not require children to use IT tools for design purposes until level 4. They are expected to explore/find rules and predict using software like simulations and adventure programs. Unfortunately, there is no recognition of the vital role such software can play in science and the humanities. With an A3000 upgraded with the Pres A3K6/12 disc interface you can run a number of BBC B simulations/adventures. Among them:

- *Into The Unknown*, *1665-The Great Plague* (Tressel)
- Almost all the Fernleaf simulations
- *Coffee*, *Search*, *Rescue* (Storm Software)
- *Slick* (BP Software)
- Most of 4Mation's adventures



Impression: best in DTP

SOFTWARE Bargains AND Mercury Games

Archimedes — Software Checklist — Archimedes

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1st Word Plus (V2)	91.94	79.95
8bit Sound Smp. + Midi	224.25	169.95
8bit Sound Smp Mono	155.25	124.95
Acheton/Kingdom of Hamil	19.95	15.95
Alerion	14.95	11.95
Alien Invasion	14.95	11.95
All in Boxing	14.95	11.95
Alpha Base	49.95	39.95
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Amazing Olie (Educ)	16.04	14.95
Ancestry	79.95	69.95
Ansi C (Release 3)	171.35	144.95
Apocalypse	29.95	29.95
ARC-COMM	33.35	29.95
ARC-PCB	195.00	175.95
ARC-PCB Professional	375.00	319.95
Arc Games Controller	40.24	33.95
Arcade 3 Compilation	14.95	11.95
Arc Pinball	24.95	19.95
Arcade Soccer	14.95	14.95
ArcDFS	29.95	26.95
Arcendium	14.95	11.95
Arch Operating System	21.95	–
Arch Assembly Lang	21.95	18.95
Arch, Basic Compiler	99.95	89.95
Arch, Joystick Interface	23.95	19.95
Archimedes First Steps	9.95	7.95
Arclight	50.00	39.95
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Armadeus Sound-Samp. Board	149.95	139.95
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fun school 3

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- COLLECT - Guide the frog from log to log to create & solve the sums
- ELECTRICITY - Fix the incorrect circuits to set the bell ringing
- JOURNEY - Travel round the village & learn about directions

OVER 7 YRS Includes:-

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fun school 2

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E-TYPE	9.95	14.95	-
ELITE	8.95	11.95	15.95
EXILE	9.95	11.95	15.95
HOSTAGES	7.95	9.95	11.95
HOLED OUT	12.95	14.95	-
KLAX (BBC only)	7.95	12.95	-
LAST NINJA 2	7.95	9.95	11.95
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● Almost all Sherston Software's adventures except those with a 'start-up' disc (see last month for simulations with a science theme).

There are several notable design tools for the school's Archimedes. *Fads* (Advisory Unit) is almost guaranteed to capture those uninterested pupils who, for one reason or another may regard computers as rather 'aggressive objects'.

The program will accept body measurements to draw a human figure on screen onto which different clothes may be 'placed' to assess the effect of fashion, line, proportion, pattern and colours. Clothes and accessories can be designed and tried; the results may be saved and printed. *Fads* is a really super little program.

At the last *BAU* show Data Design was showing its Archimedes version of the popular *Designer Castles*. The Risc OS version was certainly far quicker and smoother in operation than its eight-bit predecessor. We await the final version with anticipation.

Any discussion of design with the Archimedes must include what has virtually become the standard 3D graphics and animation system.

I mean, of course the *Euclid/Mogul/Splice* trio of packages from Ace Computing. *Euclid* is a Risc OS compliant, interactive, multi-document, 3D, graphics and animation program which is so easy to get to grips with.

Designs can be put together, rotated in real time, zoomed in and out of and viewed in perspective from any position. *ArcLight* allows ray-tracing of *Euclid* 3D pictures while *Mogul* can produce 'films' of moving *Euclid* objects and allows 'fly throughs'. *Splice* permits *Mogul* films to be combined with films from other sources.

It is interesting to note that the next set of BBC TV's *Science Challenge* programmes employ *Euclid* graphics.

Measurement and control

The Technology National Curriculum expects children to use IT to measure physical quantities and to control movement. Control begins at key stage 2 (level 3) and at key stage 3 (level 6) they are expected to monitor physical events and to process, present and respond to collected data. This is developed further at key stage 4 (level 9) where the emphasis is on systems.

The Archimedes with its vast computing power and copious memory will eventually make its mark in control with object-oriented software (like that now appearing for the Apple Macintosh) which is superior to procedural languages in terms of natural usage, and offers children even greater accessibility to computer control.

Such developments take time and until they occur, the ageing model B is arguably the best computer with which to investigate control in the primary and lower-secondary classroom.

Before an Archimedes can be used for control applications, it requires a user/analogue port expansion board. A300/400 series machines require an I/O Podule (Acorn) while an A3000 needs a user/analogue expansion card (Morley/HCCS).

The best method for connecting a standard eight-input/eight-output control buffer box is Phobox Electronics' user port expander which provides BBC-type printer and user port sockets and plugs into the Arc's user port.

As a result, a printer can be left attached to the Archimedes for listing procedures and printing out commands while the user port expander's metre of cable lets a buffer box to be placed in a convenient location.

Control software for the Arc is in its infancy. Control Logo provides probably the best route for children who have learnt Logo on the BBC B. It runs as an extension to Archimedes Logo and offers the facility to add extra primitives if required.

One of the most noticeable differences between this and previous variations of Control Logo is the ability to alter the power settings on the outputs effectively altering the voltage so that lights can be dimmed and motors made to turn slowly.

However, many of the primitives are immediately familiar to children who have worked with Control Logo on BBC Bs.

As far as monitoring events is concerned there are really only two horses in the race at this time: LogIT and Sense and Control – both of which were discussed last month.

Applications and effects

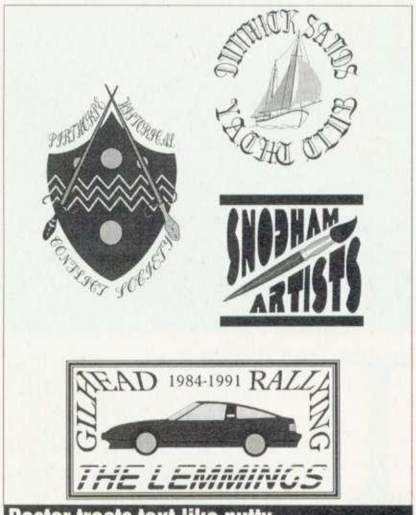
In their formative years children are expected to use a computer for simple tasks like extracting relevant information from a database. Overlay keyboards are specifically mentioned as alternative input devices. The school's Concept Keyboard can be used with an expanded Arc (see below) although few Arc programs have this option yet.

The Concept Keyboard Company has developed a customising program, (*!Intercept*) to help you tailor a Computer Concept overlay file to suit the needs of your pupils.

Most special needs software has this option and you are directed to the ever helpful Northwest Semerc for further information (*BAU* Sept/Oct 90 issues).

As children advance through the levels of AT5 of the Technology National Curriculum, the applications in real life and the various effects IT can have on decision making will become apparent.

In effect, any hardware or software children use will produce opportunities for discussion of the nature of IT and its possible ramifications, as well as its problems, limitations, shortcomings and strengths.



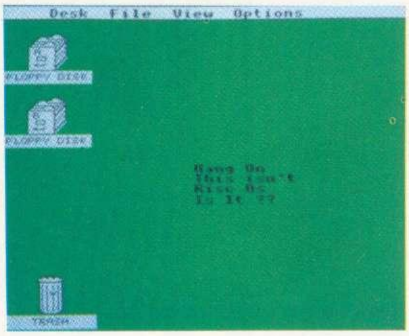
Poster treats text like putty

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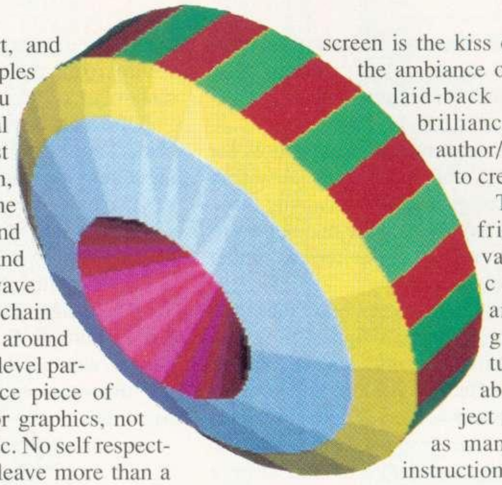
● The user port expander is available from Phobox Electronics, Holworth House, Holworth, Dorchester, Dorset DT2 8NJ. Price: £25.
● Control Logo is available from Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Price: £20.
● Datasweet is available from Kudlian Soft, Hampshire Microtechnology Centre, Connaught Lane, Portsmouth. Price: £30: primary, £80: secondary. Tel (0705) 378266.
● Dataking is available from Shenley Software, 5 Coombefield Close, New Malden, Surrey KT3 5QF. Price: £49.
● Impression 2 and Impression Junior are available from Computer Concepts Ltd, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Prices: £194.25 and £103.44 respectively (discounts and site licences available). Upgrade pack from Impressions 1 to Impression 2 £23.
● Poster is available from 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ. Price: £89.
● FontFX is available from Datastore, 6 Chatterton Road, Bromley, Kent. Price: £9.95.
● World Geography Maps are available from Micro Studio, 22 Churchgate Street, Soham, Cambridgeshire CB7 5DS. Price: £29.95.
● Fads is available from Advisory Unit, Endymion Road, Hatfield, Herts AL10 8AU. Price: £25.
● a) Euclid, b) Mogul, c) Splice and d) Arclight are available from Ace Computing, 27 Victoria Road, Cambridge CB4 3BW. Price: a) £70 b) £20 c) £30 d) £50.

SOUND AND VISION

MATHEW TIZARD stuns us with some of the effects of demos, and gives an insight into the brains that lie behind them



In last month's article, I tried to define exactly what (and why) 'demos' are, and didn't manage to reach many clear conclusions! It then occurred to me that perhaps the best way for those of you who have never seen one to appreciate what I'm getting at would be to put one on the monthly disc. So included this month, in the Freebies directory on the 3.5in disc, is a demo from a Leicestershire-based team comprising the coding talents of W Frisby and A Neville, collectively known as TCD or 'The Chip Duo'.



This is their first effort, and contains impressive examples of many of the features you might find in an archetypal demo. To obtain the best results from the program, hook up a stereo (or some earphones) to your Arc and turn up the volume nice and loud. You'll see a sine-wave scrolltext, a worm-like chain of globes which weave around the screen, a typical four-level parallax starfield, and a nice piece of multi-coloured 3D vector graphics, not to mention the great music. No self respecting demo-writer should leave more than a few of these features out! All this is happening on screen at once, and perfectly smoothly with not a flicker in sight...

I should explain that 'flickers' are a problem brought on by making the computer try to draw too many things on the screen at once and allowing it to get caught unawares halfway through updating the picture! I should also explain that flickering is a kind of demo-writers' leprosy and a juddering screen is the kiss of death to the ambiance of easy and laid-back technical brilliance that the author/s are trying to create.

There is a friendly rivalry (and a certain amount of good-natured jibing) about the subject of stuffing as many drawing instructions and sprite manipulation commands into one screen-update, or V-Sync, as is physically possible. 'V-Sync Cramming' is just one of the areas where the techniques are being constantly honed and improved to give the progressively cleverer illusions needed to keep the viewer's attention. With the TCD demo, you can use the mouse to control the direction in which the scrolltext moves. Use the Select button to start it going to the left, Adjust to make it go right and Menu to keep the wave moving, and freeze the text where it is. By the way, if you can't be bothered to sit through the message, then just load the whole file into *!Edit* and then use the search utility to find the text. The demo is very friendly and will return you cleanly to the desktop if you press ESCAPE. The music is played, as in many demos, using the 'Soundtracker playroutine' written by Hugo Fiennes. This module allows music/sample files ported from 16-bit machines to be played on the Arc, giving only a small (but variable) reduction in the speed of other operations/applications running at the same time. What's more, the routine is public domain, so anyone is free to use it in their own programs as long as a credit is given.



It is now possible to write your own music to accompany demos using The Serial Port's *Tracker* package. The author of this program is one Fabrice Mercier, who is a member of a French programming crew

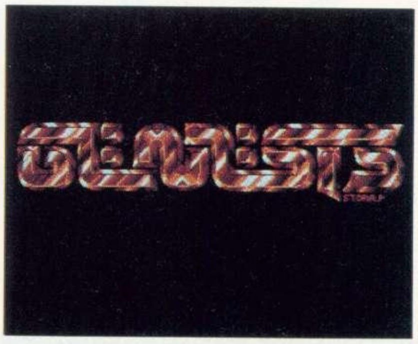
known as Arc Angels, who were responsible for the *!Balls* and *!ArcAngels* demos mentioned last month. Hugo Fiennes also goes by the name of Alt-Man. He was the man who started the ball rolling for Archimedes demo-writing and it's his work which gave others the inspiration to write more. He has produced five demos (and is currently working on a sixth) and although they do look a little simple by the latest eye-popping standards, they are nonetheless classics of their kind. He is also the master of the amusing scrolltext. Here are some examples of his potted philosophy – 'How long a minute is depends on which side of the bathroom door you are on', 'It is a mistake to let anything mechanical know that you are in a hurry', 'If you hit two keys at the same time, the one you didn't want appears on the screen', etc, etc.

Other demo-writers include the odd bit of wry humour in their work as well. For example, the '32,768 colours' demo from Noah is patently impossible, since the unexpanded VIDC hardware can only cope with 4,096 colours anyway. However, nobody is absolutely sure if it's a joke; nobody's been bothered to count the colours yet! Many people have been taken in by that particular demo though, and are surprised when they're put right! Other prolific Arc demo-producing crews include Brothers In Arm, from Norway, who have released no less than eight demos to date and not forgetting SICK...

SICK (The Slightly-Intelligent, Crazy Rosebush... No, don't ask me why they're called that, or which one of them can't spell for that matter!) are a group of Arc enthusiasts from Dublin. I've had a sneak



preview of their latest 800K megademo, 'Bananaland', which is nearing completion. Very impressive it is too, containing several sections: the obligatory star-fields, a scrolltext which scales new depths of illegibility, and a pair of 3D spinning globes (with disproportionately large Irelands!) Another part of the demo is a sequence in which about 100 globe-sprites spin around, in pseudo 3D, obeying complex equations of motion. This part is based on a program of theirs called *Spuon Dancer* and gives a stunning effect similar to that in William Latham's award-winning short computer generated film – *The Evolution Of For*. A megademo is simply a demo which grows, and has chunks added to it, until it becomes so large that it eventually takes up an entire disc. Understandably, these enormous works can take anything up to a year or more to finish (but this might well have something to do with either the creative blocks their writers experience, or the fact that they can't be bothered to finish them!) For those of you who are now dying to write your own demo, but haven't got any coding experience – don't despair. It is possible to achieve



some pretty stunning effects using nothing nothing but Basic V and a little imagination and artistic ability.

Demos are an art form of their own. They're collector's items, which really amount to an excuse to show off on the part of the programmer! They're stimulating, sometimes breathtaking, sometimes banal or just plain silly, but always entertaining. There is however a strong sense of irritation bordering on anger, that the people who create them don't do anything constructive with their obvious programming ability, and near-genius (in some cases). I agree with this, and urge any prospective writers of demos to write them by all means, but also try to think of some practical application for the routines. For example, I've seen demos containing ideas which would make marvellously original games, but they never see the light of day.

Anybody who's written a good machine-code demo, feel free to send me a copy here at BBC Acorn User, *20-26 Brunswick Place, London N1 6DJ.*

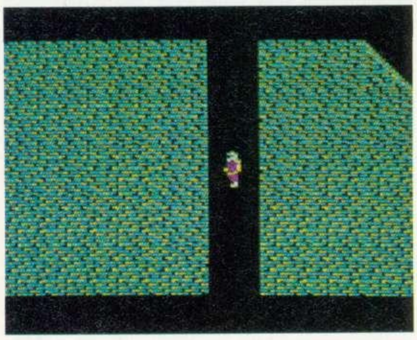


BOX COPY NEW DEMOS

- The Chip Duo (Bill & Nevy) *!TCD* (on the monthly disc)
- Brothers in Arm *Raytrace2* Arc Angels/The Swiss Section
- *!Beastie* (4096 colours)
- *!Artwork* Justin M Fielder
- *!JoustEx!* (under development) Patrick Stein (Germany)
- *!Demo-No1* (3D wire frame) IRQ-Man (Pat Smith, Cornwall)
- *!IrqDemo-1* Robert Carter (New Zealand)
- *!Scroller* Software†Evolution (Germany)
- *!Cubitus* Deltazone (Britain)
- *!Deltazone* Genesis/The Dreamers (Britain) *!Blood* Paul Vigay (Britain)
- *!PV-Demo* (currently the only demo which runs on the icon bar!) Bijorn E Flotten (Norway)
- *ArcticDemo* Unknown Author
- *!Rats* (bouncing rodents) SICK (Dublin) *SICK-1*
- *I 'Bananaland'* (under development)

SAM GREENHILL with more clues on the escape from this classic adventure

OUT OF EXILE



Last month I revealed the first half of the *Exile* map but you're now pretty stuck until next month because you won't know where (J) is until we print the lower half of the map. But, for now, let's continue with the clues...

(28) Save your position on a separate disc and explore for now. Basically, (J) is the bottom of the windy shaft. See how far you can get before next month. The next bit's easy anyway. <P> boulder and <FD> windy shaft using @.

At (J) <R> then take boulder up again to (H3). <D> and <T> to (J). <R>.

(29) <}J1> and <PS>. <}J3> and <F> all the piranhas. <}J2> and entice the fireball in for a swim. This should dampen its spirit.

(30) <}O4>. Kill the imps then fly through the crack (it is possible!) to get the key. This can be used to deactivate the transporters at (C3) and (C4).

(31) Drift up the windy shaft to (L). <}L1> and scroll left. Wait for an imp then <}L2>. Wait for the door then get the whistle.

(32) <}C4> switch off the transporters at (C3) and (C4) then <}C6>. <R> then leap up to the protection suit and shoot it down. <T> before the grenades explode. <P> the protection suit. Note you have found an infinite supply of grenades.

(34) <}K>. Destroy the turret with the icer or test out your newfound grenade supply. Open the door. The switch at (K1) can be used to destroy robots later in the game.

(35) <}K2>. <TH> a grenade through the crack to push the robot into the transporter, then <}K1> <PS>. Chatter the small round blue robot is an infinite supply of energy. Collect mushrooms, pass them through fire to make them into coronium, then feed them to Chatter and whistle. Wait until you have the radiation pill if you can.

(36) <}I2>. Squeeze through the crack.

(37) <TH> two grenades at the beehive. <*>. <FR> and either push or shoot the block to <I7>.

(38) Take the large block to (M) via (L3). It is to protect you from the green frogmen. Put it between them and you.

(39) <SAVE>.

(40) <}L5>. The pink frogman is afraid of blue mushrooms, and loves pink grubs. He is (conveniently) attracted to the large block. Pink grubs like noise and are in limited supply so you must be economic with them. Get a pink grub and use it to lead the frogman to (M).

(41) Let the pink frogman push the green frogmen into the fire at (M5). Note that it is important to stand on his head while he does this. Push the block into the water at (M1) then <R>. <SAVE>.

(42) <}N2>. P.P.P.Pick up a piranha and <S>. <F> the others. Get the pink frogman to (N3) via (N2) (using grubs). Get him to push you to (N4) by holding a grub in front of you. In some versions of *Exile* the blue mushrooms don't completely space you out and so you can still walk. Get the fish at (N) or the coronium rock at (N6) to weigh you down, and then you won't need the frogman.

(43) Stand at (N5) and <G> the piranha. Then <S>. Repeat this until the radiation pill is within reach. Go get it. Keep the piranha.

(44) <T> to (M1). <}N6>. Take coronium boulder to (M7) and <R>.

(45) <}M8> and <FU> fast shooting the switch to the right. The door opposite the gargoyle will open making it easier to miss the fireballs.

(46) <}M6>. <F> the birds. <P> the coronium boulder and <D> down past the gargoyle. <T>. Push the block into the water at (M1). Take the boulder to (M1) and <D> it on top of the block.

(47) <}M7> and drop the other boulder so the two make contact just next to the door at (M1). <*>. A nuclear explosion follows.

(48) <}J5>.

Feed an imp with a piranha and get it back to its nest. It will give you a nice present, even nicer than the other presents you've been given.

(49) <}M8> and <R>. <PS> until the vertical door is closed. <}M9> and <F> switch. <}M2> and <P> boulder. <FL> fast and <TH> the boulder so it lands just to the left of the horizontal slab. <}M2> and <D> RCD. <T> to (M8). <F> the switch to close the door. <P> boulder and <SAVE> then take it to (J5). You have to sneak past the imps in order to stop them detonating the coronium, but don't kill them, they are useful later on.

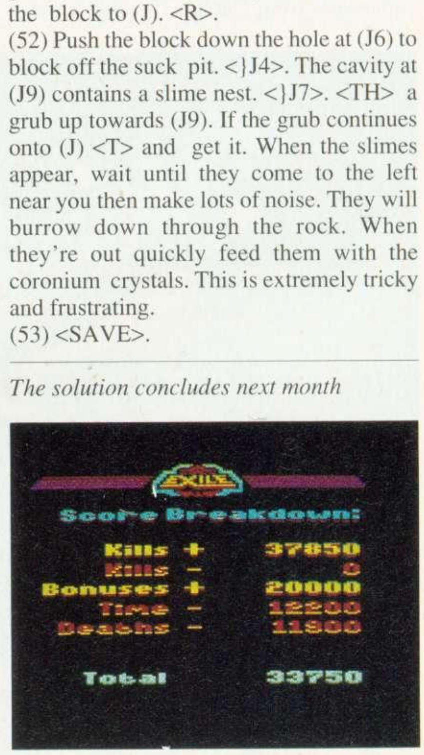
(50) You need another coronium rock to blow the door. Get some coronium crystals from the imps and feed them to the green slimes at (M3). They will turn into yellow boulders. Take a yellow boulder to (M4) as per instruction (49). Put it under the acid drops at (M4).

(51) Blow the door at (J5) and retrieve any equipment left at (M2). Incidentally there is no way of getting coronium or slimes from the right to the left of the windy shaft. You must use (O7) and (J9). Get the block to (J5). <P> the big fish at (N) and take it to (O1). Push it into (O2), then <}J5>. Empty your pockets. <P> and <S> two grubs and two coronium crystals. Push/shoot the block to (J). <R>.

(52) Push the block down the hole at (J6) to block off the suck pit. <}J4>. The cavity at (J9) contains a slime nest. <}J7>. <TH> a grub up towards (J9). If the grub continues onto (J) <T> and get it. When the slimes appear, wait until they come to the left near you then make lots of noise. They will burrow down through the rock. When they're out quickly feed them with the coronium crystals. This is extremely tricky and frustrating.

(53) <SAVE>.

The solution concludes next month



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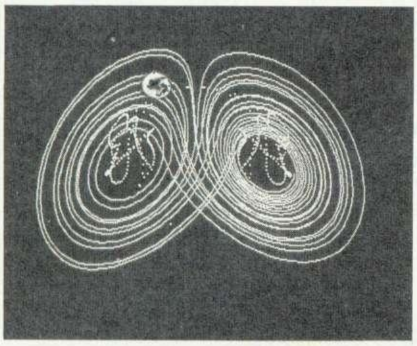


Illustration features Archimedes, Scan-Light Junior and Laser-Direct HI-Res.

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ATTRACTING ALL SORTS



MICHAEL ATTENBOROUGH unleashes the phenomenon of Chaos in 3D, in the form of the Lorenz attractor

Many computer graphics programs have been based on what is known as Chaos – complex patterns arising from simple mathematical formulae and having a strong dependence on the initial conditions.

This program illustrates one of the earliest known mathematical objects of this type, the Lorenz attractor. This is a three-dimensional figure which has been described as looking like a mask or a butterfly's wings.

It is often used as a symbol for chaotic behaviour, for example in *New Scientist*'s recent series on chaos, but it is rarely seen on computers.

This program enables you to see it in all its 3D glory and to watch the dynamic process that is at its heart in motion.

Chaotic behaviour generally occurs when a non-linear function is repeatedly applied to a variable or set of variables. When this is done, the variables often end up moving towards a certain value or set of values, sometimes ending up in a repetitive cycle.

These values and cycles are known as attractors, and a given function can have several.

To make the behaviour of the variables visible, they are used to define the co-ordinates of a point, with the number of dimensions depending on the number of variables.

Mandelbrot pictures, for example, are produced by repeatedly applying a function to a pair of variables, and seeing if these move towards an attractor at infinity.

If they do, the point corresponding to that pair of variables is given a colour depending on how fast they move towards infinity.

If they don't, it is coloured black. Whereas the Mandelbrot function has two variables and is plotted as a flat picture, the Lorenz function has three, and therefore has to be plotted in three dimensions.

The relationship between the function and the picture is simpler than in a Mandelbrot plot – some initial points are set up, then the function is applied to all of them to give a new position for each.

The variables only change a little each time the function is applied, so the points move a short distance. When the process is repeated, the points can be seen to move on curved trajectories.

The points shown on the screen are just the 3D representation of the current values of the variables.

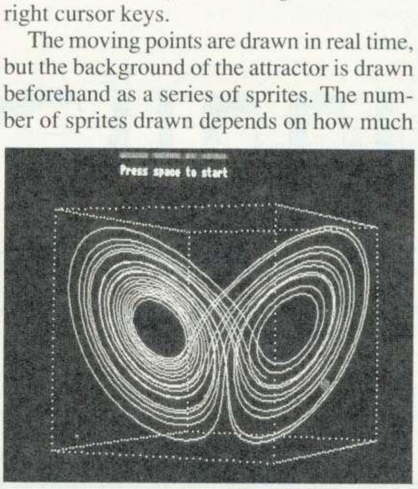
The attractor for the Lorenz function is not a point or a repeated cycle, but what is known as a strange attractor. When drawn in 3D, it appears as two whirlpool loops with flow lines going between them.

The attractor has infinitely fine structure (like a Mandelbrot set), and it is impossible to predict which loop a point will move to in the long term – these are common properties of chaotic behaviour.

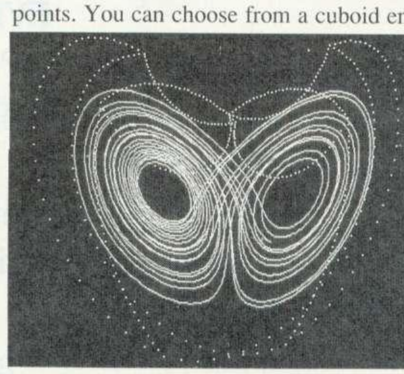
The Lorenz function is similar in some ways to the equations describing weather, and watching this program may give you some idea why long term weather prediction is impossible.

The program allows you to watch a group of points moving into and around the attractor, and you can rotate the whole picture in 3D at any time using the left and right cursor keys.

The moving points are drawn in real time, but the background of the attractor is drawn beforehand as a series of sprites. The number of sprites drawn depends on how much free memory the program can find – more memory enables the picture to be rotated through a greater angle.



When the background sprites have been drawn, a menu will appear which gives you a choice of four initial distributions of points. You can choose from a cuboid enclosing the attractor, a line, or a tightly or loosely bunched random group.



When you have chosen the initial points, they will be shown against a background of the attractor. From this point onwards, the picture can be rotated both ways with the cursor keys. Press the space bar to start the points moving.

The bunched point groups demonstrate that even if you know the initial positions (the initial values of the three variables) to a high degree of accuracy, it is not possible to predict where they will end up.

Even the tightly bunched group is, after a few revolutions, stretched into a line which is then broken into two and mixed with itself repeatedly.

Pressing ESCAPE during the animation will return you to the menu without having to wait for the background sprites to be redrawn.

The background pictures are produced by taking one initial point and repeatedly applying the Lorenz function to it, connecting the points it goes to with lines. The same picture is drawn several times from different angles.

This is perhaps not the 'real' Lorenz attractor, but its infinite structure makes it impossible to draw in more than outline.

PICTURE THIS

JEFF TULLIN extends his program from last year, to make storing this year's holiday snaps even easier

In the February 1990 issue of *BAU* was a feature headed 'Take Your Pic'. The program was a specially written database, designed to store and retrieve details of photographic images, a job which is next to impossible using conventional databases, as anyone who has attempted it would confirm. Since its publication, I have received several suggestions for improvements, corrections, and even full-blown heavily modified programs, from people who have found a use for it themselves. Most of the changes suggested, however, relied heavily on the additional features found in the Master machines. The original program was designed for use on as many Acorn machines as possible, and I wanted the same to be true of any new versions, so none of the changes outlined here require anything more than a basic model B.

I assume you have a working copy of the original *FotoFiler*, as all the changes listed refer to the original line number sequence, and disturb it as little as possible.

A couple of bugs surfaced after a time. The first is not really a bug at all. I have been told that line 660 should read:

```
660 PROCalter(-1)
```

otherwise the (D)elete function will not work. True, but its use is disabled here (in PROCaddrecord) as I did not think anyone would want to save a 'deleted' item to disc as a new entry. Still, you pays your money..

FNyes, as written, will not detect lower case letter 'y'. Some people prefer a single key press option here.This is achieved by:

```
1990  REPEAT:X%=INSTR("NnYy",GET$)
  :UNTIL X%:=(X%>2)
```

PROCaddrecord can now use this new function, and can be amended to read:

```
670 PROCp(26,20,wipe$,0)
680 PROCp(26,20,"Save to disc?
(Y/N )",0)
690 IF FNyes PROCsave(-1)
700 :
```

A similar problem with lower case 'q' is resolved by:

```
1380 UNTIL I=81 OR I=113 OR EOF
```

Under certain circumstances, the program would add 50 superfluous spaces to the title of a photograph. A way of truncating title$ was needed, and it is corrected by:

```
2250 title$=LEFT$(title$,23)
2255 IF LEN(title$)<23 title$=title$
+ LEFT$(wipe$,23-LEN(title$))
```

Memory restraints – a big problem in developing the program – were a nuisance for ADFS users who had page values higher than the standard &1900 in DFS, or the &E00 of the Master. The answer here is to use a commercial 'cruncher', or a shadow Ram system to allow the value of HIMEM (set to &3B00 in the program, and above which some machine code is assembled) to be set much higher, allowing that much more room for variables. Multiple statement lines would also have saved space.



Improvements

The modifications I am about to describe are a little longer than a line or two, in the main, and as a result, I have listed them separately on the yellow pages. Each paragraph refers to its own short listing. Note that none of the listings is a complete procedure in its own right, merely additions or changes to existing program lines. Where a line number is duplicated, overwrite the old with the new. If the new line number doesn't exist in the original, add it.

Listing 1

In PROCfindmatch, when the program displays the pictures it finds from the database, the titles can scroll off the top of the page too fast to be read in full.This can be helped by setting 'page' mode, by issuing a VDU14 command just before display commences. I had one suggestion that the screen display be in double column output, and that is catered for here too.

Listing 2

One or two people wanted to be able to change working drives from within the program. My original intention was to have the user boot up with the 'master' program disc, then remove it, insert the 'data' disc containing the database, and continue. However, for those of you with two drives, listing 2 prompts for the working drive when the filename of the data is requested. The command OSCLI("MOUNT "+A$) can be used instead of OSCLI("DRIVE "+A$) if you are using a Master or similar.

Listing 3

If the photos you want to enter are all in correct numerical order, then having the program automatically increment the reference number would save some time in data entry. This is done using the changes in listing 3, which is a quite drastic revision, but worthwhile if you have a lot to do.

Listing 4

The speed at which it is possible to browse through records leaves a little to be desired. These changes allow you to skip through 10 records at a time by pressing the up/down arrow keys in addition to the left/right of the original version. Naturally, you don't want to go past the end of the file and get an EOF error, so you can trap that using the max% variable introduced in line 1272.

Finally, I'll just make a couple of suggestions for areas where improvements could still be made. Firstly, the original was presented as a two-part program for reasons of memory shortage on the 32K model B. It is possible to combine both sections into one program for the Master. Some small improvement could be made in the time spent searching the datafile if the comparison was carried out in machine code. The date that each picture was taken was important to some people, and, although I just used that as part of the title myself, you might like to alter the program to include an extra field for the date, albeit with an increased field length. A search by title might be useful too. This was left out because the title is, in theory, optional, and such a search would be really slow.

And a fully mouse driven version for the Archimedes... now there's a thought!

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Monthly Disc
Risc Revue	30						■		■	■	■	■
Eight Bits	58											
Listing 1-2		■	■	■	■	■		■	■	■	■	■
Listing 3		■	■	■	■			■	■	■	■	■
Listing 4 (1)		■	■	■	■			■	■	■	■	■
Listing 5 (2)		■	■	■	■			■	■	■	■	■
Lorenz	85											
Listing 1							■		■	■	■	■
Hat-Trix	70											
Listing 1-8 (3)		■	■	■	■			■	■	■	■	■
FotoFiler	87											
Listings 1-5 (4)		■	■	■	■	■		■	■	■	■	■

Note (1) Need Sideways Ram
(2) Needs WE Sideways Ram Board
(3) Due to the length of this listing it has been necessary to use more than four columns on some pages
(4) Needs original foto filer program. A full version with changes is included on the February monthly disc.

RISC REVUE

Listing 1

```
   1Ø REM >CTtest (RR1)
   2Ø REM by Dave Acton
   3Ø REM for Archimedes only
   4Ø REM (c) BAU Feb 1991
   5Ø :
   6Ø *RMEnsure ColourTrans Ø Error Ø Pr
ogram requires ColourTrans module
   7Ø MODE 13
   8Ø OFF
   9Ø REPEAT
  1ØØ CLS
  11Ø startcol%=(RND(&1ØØØØØØ)-1)<<8
  12Ø endcol%=(RND(&1ØØØØØØ)-1)<<8
  13Ø PROCsplit(startcol%,r1%,g1%,b1%)
  14Ø PROCsplit(endcol%,r2%,g2%,b2%)
  15Ø PRINT"Start colour: ";r1%;",";g1%;
",";b1%
  16Ø PRINT"End colour: ";r2%;",";g2%;",
";b2%
  17Ø FOR x%=Ø TO 1279 STEP 32
  18Ø r%=r1%+(r2%-r1%)*x%/128Ø
  19Ø g%=g1%+(g2%-g1%)*x%/128Ø
  2ØØ b%=b1%+(b2%-b1%)*x%/128Ø
  21Ø SYS "ColourTrans_SetGCOL",(b%<<24)
+(g%<<16)+(r%<<8)
  22Ø RECTANGLE FILL x%,Ø,32,8ØØ
  23Ø NEXT
  24Ø PRINT"Press a key..."
  25Ø wait=GET
  26Ø UNTIL FALSE
  27Ø END
  28Ø :
  29Ø DEF PROCsplit(c%,RETURN r%,RETURN
g%,RETURN b%)
  3ØØ r%=(c%>>8) AND &FF
  31Ø g%=(c%>>16) AND &FF
  32Ø b%=(c%>>24) AND &FF
  33Ø ENDPROC
```

Listing 2

```
   1Ø REM >Closest (RR2)
   2Ø REM by Dave Acton
   3Ø REM for Archimedes only
   4Ø REM (c) BAU Feb 1991
   5Ø :
   6Ø MODE 13
   7Ø OFF
   8Ø colours%=256
   9Ø rfact=Ø.39
  1ØØ gfact=Ø.51
  11Ø bfact=Ø.1Ø
  12Ø DIM r%(&FF),g%(&FF),b%(&FF)
  13Ø FOR i%=Ø TO colours%-1
  14Ø SYS "OS_ReadPalette",i%,16 TO ,,c%
  15Ø r%(i%)=(c%>>8) AND &FF
  16Ø g%(i%)=(c%>>16) AND &FF
  17Ø b%(i%)=(c%>>24) AND &FF
  18Ø NEXT
  19Ø rx%=64Ø+3ØØ*COSRAD(6Ø)
  2ØØ ry%=512+3ØØ*SINRAD(6Ø)
  21Ø gx%=64Ø+3ØØ*COSRAD(18Ø)
  22Ø gy%=512+3ØØ*SINRAD(18Ø)
  23Ø bx%=64Ø+3ØØ*COSRAD(3ØØ)
  24Ø by%=512+3ØØ*SINRAD(3ØØ)
  25Ø sq%=16
  26Ø FOR xx%=Ø TO 1279 STEP sq%
  27Ø FOR yy%=Ø TO 1Ø23 STEP sq%
  28Ø PROCgcol(FNclosest(FNdist(xx%,yy%,
rx%,ry%),FNdist(xx%,yy%,gx%,gy%),FNdist(
xx%,yy%,bx%,by%)))
  29Ø RECTANGLE FILL xx%-sq%/2,yy%-sq%/2
,sq%-1,sq%-1
  3ØØ NEXT
  31Ø NEXT
  32Ø END
  33Ø :
  34Ø DEF FNdist(xØ%,yØ%,x1%,y1%)
  35Ø LOCAL d%
  36Ø d%=255-(SQR((x1%-xØ%)^2+(y1%-yØ%)^
2))/2
  37Ø IF d%<Ø d%=Ø
  38Ø =d%
  39Ø :
  4ØØ DEF FNclosest(r%,g%,b%)
  41Ø LOCAL i%,dist%,bdist%,best%
  42Ø best%=Ø
  43Ø bdist%=&7FFFFFFF
  44Ø FOR i%=Ø TO colours%-1
  45Ø dist%=rfact*(r%(i%)-r%)^2+gfact*(g
%(i%)-g%)^2+bfact*(b%(i%)-b%)^2
  46Ø IF dist%<bdist% bdist%=dist%:best%
=i%
  47Ø NEXT
  48Ø =FNcolournumtogcol(best%)
  49Ø :
  5ØØ DEF FNcolournumtogcol(c%)
  51Ø IF colours%<256 THEN =c%
  52Ø =(c% AND %1ØØØØ111)+((c% AND %Ø111
ØØØØ)>>1)+((c% AND %ØØØØ1ØØØ)<<3)
  53Ø :
  54Ø DEF PROCgcol(c%)
  55Ø IF colours%<256 GCOL c% ELSE GCOL
(c%>>2) TINT (c% AND 3)<<6
  56Ø ENDPROC
```

Listing 3

```
   1Ø REM >Dither (RR3)
   2Ø REM by Dave Acton
   3Ø REM for Archimedes only
   4Ø REM (c) BAU Feb 1991
   5Ø :
   6Ø MODE 13
   7Ø OFF
   8Ø colours%=256
   9Ø rfact=Ø.39
  1ØØ gfact=Ø.51
  11Ø bfact=Ø.1Ø
  12Ø PROCass
  13Ø DIM r%(&FF),g%(&FF),b%(&FF)
  14Ø FOR i%=Ø TO colours%-1
  15Ø SYS "OS_ReadPalette",i%,16 TO ,,c%
  16Ø red%?i%=(c%>>8) AND &FF
  17Ø green%?i%=(c%>>16) AND &FF
  18Ø blue%?i%=(c%>>24) AND &FF
  19Ø NEXT
  2ØØ rx%=64Ø+3ØØ*COSRAD(6Ø)
  21Ø ry%=512+3ØØ*SINRAD(6Ø)
  22Ø gx%=64Ø+3ØØ*COSRAD(18Ø)
  23Ø gy%=512+3ØØ*SINRAD(18Ø)
  24Ø bx%=64Ø+3ØØ*COSRAD(3ØØ)
  25Ø by%=512+3ØØ*SINRAD(3ØØ)
  26Ø sq%=16
  27Ø FOR xx%=Ø TO 1279 STEP sq%
  28Ø FOR yy%=Ø TO 1Ø23 STEP sq%
  29Ø rlevel%=FNdist(xx%,yy%,rx%,ry%)
  3ØØ glevel%=FNdist(xx%,yy%,gx%,gy%)
  31Ø blevel%=FNdist(xx%,yy%,bx%,by%)
  32Ø PROCgettwobest(rlevel%,glevel%,ble
vel%,c1%,c2%)
  33Ø FOR x%=xx% TO xx%+sq%-1 STEP 4
  34Ø FOR y%=yy% TO yy%+sq%-1 STEP 4
  35Ø IF ((x% DIV 4)+(y% DIV 4)) MOD 2=Ø
 PROCgcol(c1%) ELSE PROCgcol(c2%)
  36Ø POINT x%,y%
  37Ø NEXT
  38Ø NEXT
  39Ø NEXT
  4ØØ NEXT
  41Ø END
  42Ø :
  43Ø DEF FNdist(xØ%,yØ%,x1%,y1%)
  44Ø LOCAL d%
  45Ø d%=255-(SQR((x1%-xØ%)^2+(y1%-yØ%)^
2))/2
  46Ø IF d%<Ø d%=Ø
  47Ø =d%
  48Ø :
  49Ø DEF PROCgettwobest(C%,D%,E%,RETURN
 best1%,RETURN best2%)
  5ØØ LOCAL A%
  51Ø A%=USR(twoclosest)
  52Ø best1%=(A% AND &FF)
  53Ø best2%=(A% AND &FFØØ)>>8
  54Ø best1%=FNcolournumtogcol(best1%)
  55Ø best2%=FNcolournumtogcol(best2%)
  56Ø ENDPROC
  57Ø :
  58Ø DEF FNcolournumtogcol(c%)
  59Ø IF colours%<256 THEN =c%
  6ØØ =(c% AND %1ØØØØ111)+((c% AND %Ø111
ØØØØ)>>1)+((c% AND %ØØØØ1ØØØ)<<3)
  61Ø :
  62Ø DEF PROCgcol(c%)
  63Ø IF colours%<256 GCOL c% ELSE GCOL
(c%>>2) TINT (c% AND 3)<<6
  64Ø ENDPROC
  65Ø :
  66Ø DEF PROCass
  67Ø DIM code% &2ØØØ
  68Ø temp=Ø
  69Ø temp2=1
  7ØØ redlev=2
  71Ø greenlev=3
  72Ø bluelev=4
  73Ø bestdist=5
  74Ø red1=6
  75Ø green1=7
  76Ø blue1=8
  77Ø count=9
  78Ø count2=1Ø
  79Ø temp3=11
  8ØØ dist=12:temp4=12
  81Ø sp=13:link=14:pc=15
  82Ø FOR pass%=Ø TO 2 STEP 2
  83Ø P%=code%
  84Ø [OPT pass%
  85Ø .calcfact
  86Ø MOV temp3,temp
  87Ø MUL temp4,temp,temp3
  88Ø MUL temp,temp4,temp2
  89Ø MOV temp,temp,ASR #1Ø
  9ØØ MOV pc,link
  91Ø :
  92Ø .redmul
  93Ø EQUD rfact*1Ø24
  94Ø .greenmul
  95Ø EQUD gfact*1Ø24
  96Ø .bluemul
  97Ø EQUD bfact*1Ø24
  98Ø ]
  99Ø red%=P%
 1ØØØ green%=P%+&1ØØ
 1Ø1Ø blue%=P%+&2ØØ
 1Ø2Ø P%+=&3ØØ
 1Ø3Ø [OPT pass%
 1Ø4Ø .twoclosest
 1Ø5Ø STMFD (sp)!,{link}
 1Ø6Ø MOV count,#colours%-1
 1Ø7Ø .buildtabloop
 1Ø8Ø MOV temp,count
 1Ø9Ø LDR temp2,redmul
 11ØØ BL calcfact
 111Ø ADR count2,redtab%
 112Ø STR temp,[count2,count,ASL #2]
 113Ø MOV temp,count
 114Ø LDR temp2,greenmul
 115Ø BL calcfact
 116Ø ADD count2,count2,#&4ØØ
 117Ø STR temp,[count2,count,ASL #2]
 118Ø MOV temp,count
 119Ø LDR temp2,bluemul
 12ØØ BL calcfact
 121Ø ADD count2,count2,#&4ØØ
 122Ø STR temp,[count2,count,ASL #2]
 123Ø SUBS count,count,#1
 124Ø BPL buildtabloop
 125Ø MOV bestdist,#&7ØØØØØØØ
 126Ø MOV count,#colours%-1
 127Ø .twoclosestloop1
 128Ø MOV count2,#colours%-1
 129Ø ADR temp,red%
 13ØØ LDRB red1,[temp,count]
 131Ø ADR temp,green%
 132Ø LDRB green1,[temp,count]
```

Continued ▶

RISC REVUE

◀ Continued

```
1330 ADR temp,blue%
1340 LDRB blue1,[temp,count]
1350 .twoclosestloop2
1360 ADR temp,red%
1370 LDRB temp2,[temp,count2]
1380 ADD temp,red1,temp2
1390 SUBS temp,redlev,temp,ASR #1
1400 RSBMI temp,temp,#0
1410 ADR temp3,redtab%
1420 LDR dist,[temp3,temp,ASL #2]
1430 CMP dist,bestdist
1440 BGE abort
1450 ADR temp,green%
1460 LDRB temp2,[temp,count2]
1470 ADD temp,green1,temp2
1480 SUBS temp,greenlev,temp,ASR #1
1490 RSBMI temp,temp,#0
1500 ADD temp3,temp3,#&400
1510 LDR temp,[temp3,temp,ASL #2]
1520 ADD dist,dist,temp
1530 CMP dist,bestdist
1540 BGE abort
1550 ADR temp,blue%
1560 LDRB temp2,[temp,count2]
1570 ADD temp,blue1,temp2
1580 SUBS temp,bluelev,temp,ASR #1
1590 RSBMI temp,temp,#0
1600 ADD temp3,temp3,#&400
1610 LDR temp,[temp3,temp,ASL #2]
1620 ADD dist,dist,temp
1630 CMP dist,bestdist
1640 MOVLT bestdist,dist
1650 STRLT count,besttwo
1660 STRLTB count2,besttwo+1
1670 .abort
1680 SUBS count2,count2,#1
1690 BPL twoclosestloop2
1700 SUBS count,count,#1
1710 BPL twoclosestloop1
1720 LDR R0,besttwo
1730 LDMFD (sp)!,{pc}
1740 :
1750 .besttwo
1760 EQUD 0
1770 ]
1780 redteb%=P%
1790 greentab%=P%+&400
1800 bluetab%=P%+&800
1810 NEXT pass%
1820 ENDPROC
```

Listing 4

```
10 REM >CheckMods (RR4)
20 REM Reinstalls unplugged ROM modules
30 REM by Nick Furness & Mark Stedman
40 REM for Archimedes only
50 REM (c) BAU Feb 1991
60 :
70 count=0
80 hourglass=0
90 SYS "Hourglass_On"
100 hourglass=1
110 PROCmainloop
120 PROCreport
130 END
140 :
150 DEF PROCmainloop
160 PRINT'"Checkmods by Nick Furness & Mark Stedman"
170 area=-1
180 PRINT'"Checking ROM area..."
190 PROCcheckmods
200 FOR area=0 TO 3
210 PRINT "Checking Podule '";area;" area..."
220 PROCcheckmods
230 NEXT
240 ENDPROC
250 :
260 DEF PROCcheckmods
270 modnum=0
280 oldmodnum=-1
290 LOCAL ERROR
300 ON ERROR LOCAL RESTORE ERROR:ENDPROC
310 REPEAT
320 IF hourglass=1 AND area<0 SYS "Hourglass_Percentage",((modnum/38)*100)
330 oldmodnum=modnum
340 SYS "OS_Module",19,modnum,area TO ,modnum,,pointer%,state,podchunk
350 IF (oldmodnum<modnum) OR (modnum=1 AND oldmodnum=-1) THEN
360 CASE state OF
370 WHEN -1:
380 count+=1
390 OSCLI ("RMReInit "+FNstripzero(pointer%))
400 PRINT FNstripzero(pointer%);TAB(30);" : Module number ";modnum;" is now re-initialised."
410 WHEN 0:
420 IF area>=0 THEN
430 count+=1
440 OSCLI("RMReInit "+FNstripzero(pointer%))
450 PRINT FNstripzero(pointer%);TAB(30);" : Module number ";modnum;" is now re-initialised."
460 ENDIF
470 ENDCASE
480 ENDIF
490 UNTIL oldmodnum>modnum
500 RESTORE ERROR
510 ENDPROC
520 :
530 DEF FNstripzero(pointer%)
540 temp$=""
550 strp%=0
560 WHILE ?(pointer%+strp%)>32
570 temp$+=CHR$(?(pointer%+strp%))
580 strp%+=1
590 ENDWHILE
600 =temp$
610 :
620 DEF PROCreport
630 SYS "Hourglass_Off"
640 hourglass=0
650 IF count=0 THEN
660 PRINT'"No modules were unplugged."
670 ELSE
680 IF count=1 THEN
690 PRINT'count;" module successfully re-initialised."
700 ELSE
710 PRINT'count;" modules successfully re-initialised."
720 ENDIF
730 ENDIF
740 ENDPROC
```

Listing 5

```
10 REM >Starz (RR5)
20 REM by Dave Lawrence
30 REM for Archimedes only
40 REM (c) BAU Feb 1991
50 :
60 MODE 13
70 OFF
80 stars=128
90 DIM code 2000,stardat% stars*4*4
100 PROCcode
110 PROCstars
120 CALL plot
130 END
140 :
150 DEF PROCstars
160 dat=stardat%
170 FOR i%=1 TO stars
180 dat!0=(RND(320)-1)<<16
190 dat!4=RND(254)+1
200 dat!8=(RND(1)*16)<<15
210 dat!12=!screen%+320
220 dat+=16
230 NEXT
240 ENDPROC
250 :
260 DEF PROCcode
270 xpos=1
280 ypos=2
290 vel=3
300 count=8
310 data=9
320 addr=10
330 cols=11
340 scr=12
350 FOR pass=0 TO 2 STEP 2
360 P%=code
370 [OPT pass
380 .plot
390 MOV R0,#19
400 SWI "OS_Byte"
410 MOV count,#stars
420 LDR data,stardat
430 ADR cols,colours
440 LDR scr,screen%
450 .loop
460 LDR xpos,[data],#4
470 LDR ypos,[data],#4
480 LDR vel,[data],#4
490 LDR addr,[data],#4
500 MOV R0,#0
510 STRB R0,[addr]
520 STRB R0,[addr,#1]
530 STRB R0,[addr,#2]
540 STRB R0,[addr,#321]
550 STRB R0,[addr,#-319]
560 LDRB R0,[cols,vel,LSR #15]
570 SUBS xpos,xpos,vel
580 ADDMI xpos,xpos,#(320<<16)
590 STR xpos,[data,#-16]
600 ADD addr,scr,ypos,ASL #6
610 ADD addr,addr,ypos,ASL #8
620 STRB R0,[addr,xpos,LSR #16]!
630 STRB R0,[addr,#1]
640 STRB R0,[addr,#2]
650 STRB R0,[addr,#321]
660 STRB R0,[addr,#-319]
670 STR addr,[data,#-4]
680 SUBS count,count,#1
690 BNE loop
700 SWI "OS_ReadEscapeState"
710 BCC plot
720 MOV PC,R14
730 :
740 .screen%
750 EQUD 148
760 EQUD -1
770 :
780 .stardat
790 EQUD stardat%
800 :
810 .colours
820 EQUB &01:EQUB &01:EQUB &02:EQUB &03
830 EQUB &2C:EQUB &2D:EQUB &2E:EQUB &2F
840 EQUB &D0:EQUB &D1:EQUB &D2:EQUB &D3
850 EQUB &FC:EQUB &FD:EQUB &FE:EQUB &FF
860 ]
870 NEXT
880 SYS "OS_ReadVduVariables",screen%,screen%
890 screen%!4=!screen%+&14000
900 ENDPROC
```

Listing 6

```
10 REM >!StartEdit (RR6)
20 DIM taskid% 5
30 $taskid%="TASK"
40 task$="!Edit startup"
50 SYS "Wimp_Initialise",200,!taskid%,task$ TO ,handle%
60 SYS "OS_GetEnv" TO p$
70 l%=LEN(p$)
80 WHILE MID$(p$,l%,1)<>" " AND l%>1
90 l%-=1
100 ENDWHILE
110 p$=MID$(p$,l%)
120 IF INSTR(p$,"!StartEdit")>0 THEN p$=""
130 SYS "Wimp_StartTask","<Obey$Dir>.!Run2 "+p$
140 SYS "Wimp_CloseDown"
150 END
```

EIGHT BITS

Listing 1

```
10 REM File Search
20 REM by Andrew Pepperell
30 REM for B/B+/M/C/E
40 REM (c) BAU Feb 91
50 :
60 PROCassemble
70 PROCchecksum
80 PROCsavecode
90 END
100 :
110 DEFPROCsavecode
120 name$="FSearch"
130 OSCLI("SAVE "+name$+" "+STR$~start+" "+STR$~(P%-1))
140 ENDPROC
150 :
160 DEFPROCchecksum
170 T%=0
180 FOR M%=start TO P%-1
190 T%=T%+?M%
200 NEXT
210 IF T%=59351 ENDPROC
220 VDU 7
230 PRINT "Error in Code."
240 END
250 :
260 DEFPROCassemble
270 osargs=&FFDA
280 osfind=&FFCE
290 osfile=&FFDD
300 osbget=&FFD7
310 osnewl=&FFE7
320 oswrch=&FFEE
330 :
340 start=&900
350 buffer=&A8
360 :
370 FOR pass=0 TO 3 STEP 3
380 P%=start
390 [
400 OPT pass
410 LDA #1
420 LDY #0
430 LDX #buffer
440 JSR osargs
450 LDY #0
460 LDA (buffer),Y
470 CMP #13
480 BNE syntaxok
490 .badsyntax
500 BRK
510 EQUB (16)
520 EQUS ("FSearch <fname> <byte>")
530 BRK
540 .syntaxok
550 LDA (buffer),Y
560 CMP #32
570 BEQ endofname
580 CMP #13
590 BEQ badsyntax
600 INY
610 JMP syntaxok
620 .endofname
630 LDA #13
640 STA (buffer),Y
650 INY
660 .findbyte
670 LDA (buffer),Y
680 CMP #13
690 BEQ badsyntax
700 CMP #32
710 BNE readbyte
720 INY
730 JMP findbyte
740 .readbyte
750 LDA #0
760 STA searchbyte
770 TYA
780 CLC
790 ADC buffer
800 STA buffer+2
810 LDA buffer+1
820 ADC #0
830 STA buffer+3
840 LDY #0
850 LDA (buffer+2),Y
860 CMP #34
870 BNE evaluateexpression
880 INY
890 LDA (buffer+2),Y
900 STA searchbyte
910 JMP dosearch
920 .evaluateexpression
930 CMP #ASC("&")
940 BNE readdecimal
950 LDA #16
960 STA digitsallowed
970 LDY #2
980 LDA (buffer+2),Y
990 DEY
1000 CMP #32
1010 BEQ readhex2
1020 CMP #13
1030 BEQ readhex2
1040 LDA (buffer+2),Y
1050 JSR whichdigit
1060 ASL A
1070 ASL A
1080 ASL A
1090 ASL A
1100 STA searchbyte
1110 LDY #2
1120 .readhex2
1130 LDA (buffer+2),Y
1140 JSR whichdigit
1150 CLC
1160 ADC searchbyte
1170 STA searchbyte
1180 JMP dosearch
1190 .readdecimal
1200 LDA #10
1210 STA digitsallowed
1220 INY
1230 LDA (buffer+2),Y
1240 DEY
1250 CMP #32
1260 BEQ readdec3
1270 CMP #13
1280 BEQ readdec3
1290 LDY #2
1300 LDA (buffer+2),Y
1310 LDY #0
1320 CMP #32
1330 BEQ readdec2
```

Continued ▶

◀ Continued

```
1340 CMP #13
1350 BEQ readdec2
1360 LDA (buffer+2),Y
1370 JSR whichdigit
1380 BEQ next1
1390 .hundredsloop
1400 LDA searchbyte
1410 CLC
1420 ADC #100
1430 STA searchbyte
1440 DEX
1450 BNE hundredsloop
1460 .next1
1470 INY
1480 .readdec2
1490 LDA (buffer+2),Y
1500 JSR whichdigit
1510 TAX
1520 BEQ next2
1530 .tensloop
1540 LDA searchbyte
1550 CLC
1560 ADC #10
1570 STA searchbyte
1580 DEX
1590 BNE tensloop
1600 .next2
1610 INY
1620 .readdec3
1630 LDA (buffer+2),Y
1640 JSR whichdigit
1650 TAX
1660 BEQ dosearch
1670 .unitsloop
1680 INC searchbyte
1690 DEX
1700 BNE unitsloop
1710 .dosearch
1720 LDA buffer
1730 STA block
1740 LDA buffer+1
1750 STA block+1
1760 LDX #block MOD 256
1770 LDY #block DIV 256
1780 LDA #5
1790 JSR osfile
1800 LDA #&40
1810 LDX buffer
1820 LDY buffer+1
1830 JSR osfind
1840 STA channel
1850 LDA #0
1860 LDX #0
1870 .blankloop
1880 STA counter,X
1890 INX
1900 CPX #4
1910 BNE blankloop
1920 .readfromfile
1930 LDY channel
1940 JSR osbget
1950 BCS close
1960 CMP searchbyte
1970 BNE incaddress
1980 JSR showmatch
1990 .incaddress
2000 CLC
2010 LDA loadaddr
2020 ADC #1
2030 STA loadaddr
2040 LDX #1
2050 .incloop
2060 LDA loadaddr,X
2070 ADC #0
2080 STA loadaddr,X
2090 INX
2100 CPX #4
2110 BNE incloop
2120 JMP readfromfile
2130 .showmatch
2140 SED
2150 CLC
2160 LDA counter
2170 ADC #1
2180 STA counter
2190 LDX #1
2200 .inccounter
2210 LDA counter,X
2220 ADC #0
2230 STA counter,X
2240 INX
2250 CPX #4
2260 BNE inccounter
2270 CLD
2280 LDY #4
2290 .showloop
2300 LDA loadaddr-1,Y
2310 JSR printhex
2320 DEY
2330 BNE showloop
2340 LDA #32
2350 JSR oswrch
2360 JSR oswrch
2370 RTS
2380 .close
2390 JSR osnewl
2400 LDX #0
2410 .textloop
2420 LDA text,X
2430 CMP #13
2440 BEQ printcounter
2450 JSR oswrch
2460 INX
2470 JMP textloop
2480 .printcounter
2490 LDY #4
2500 .prcountloop
2510 LDA counter-1,Y
2520 JSR printhex
2530 DEY
2540 BNE prcountloop
2550 JSR osnewl
2560 LDY channel
2570 LDA #0
2580 JSR osfind
2590 RTS
2600 .digits
2610 EQUS "0123456789ABCDEF"
2620 .whichdigit
2630 LDX #0
2640 .whichloop
2650 CMP digits,X
2660 BEQ foundwhich
2670 INX
2680 CPX digitsallowed
2690 BNE whichloop
2700 JMP badsyntax
2710 .foundwhich
2720 TXA
2730 RTS
2740 .block
2750 EQUW 0
2760 .loadaddr
2770 EQUD 0
2780 .counter
2790 EQUD 0
2800 EQUD 0
2810 EQUD 0
2820 .searchbyte
2830 EQUB 0
2840 .printhex
2850 PHA
2860 LSR A
2870 LSR A
2880 LSR A
2890 LSR A
2900 TAX
2910 LDA digits,X
2920 JSR oswrch
2930 PLA
2940 AND #15
2950 TAX
2960 LDA digits,X
2970 JSR oswrch
2980 RTS
2990 .text
3000 EQUS "Occurrences:"
3010 EQUB 13
3020 .channel
3030 EQUB 0
3040 .digitsallowed
3050 EQUB 0
3060 ]
3070 NEXT
3080 ENDPROC
```

Listing 2

```
10 REM Basic program protection
20 REM by Andrew Pepperell
30 REM for B/B+/M/C/E
40 REM (c) BAU Feb 91
50 :
60 PROCassemble
70 PROCchecksum
80 PROCsavecode
90 END
100 :
110 DEFPROCchecksum
120 I%=0
130 FOR M%=start TO P%-1
140 I%=I%+?M%
150 NEXT
160 IF I%=47414 ENDPROC
170 VDU 7
180 PRINT "Error in Code."
190 END
200 :
210 DEFPROCsavecode
220 name$="Protect"
230 OSCLI("SAVE "+name$+" "+STR$~start
+" "+STR$~P%)
240 ENDPROC
250 :
260 DEFPROCassemble
270 osargs=&FFDA
280 pointer=&A8
290 startaddr=&AA
300 endaddr=&AC
310 digits=&AE
320 :
330 start=&900
340 FOR pass=0 TO 3 STEP 3
350 P%=start
360 [
370 OPT pass
380 LDA #1
390 LDX #pointer
400 LDY #0
410 JSR osargs
420 LDY #0
430 LDA (pointer),Y
440 CMP #13
450 BNE countdigits
460 LDA &18
470 STA startaddr+1
480 LDA #1
490 STA startaddr
500 JMP protect
510 .countdigits
520 LDA (pointer),Y
530 CMP #13
540 BEQ counted
550 INY
560 JMP countdigits
570 .counted
580 CPY #6
590 BCC noerror
600 .error
610 BRK
620 EQUB (20)
630 EQUS ("Protect (<line>)")
640 BRK
650 .noerror
660 LDA #0
670 STA endaddr
680 STA endaddr+1
690 DEY
700 LDA #0
710 STA digits
720 .addloop
730 LDA (pointer),Y
740 JSR whichdigit
750 TYA
760 PHA
770 CPX #0
780 BEQ zero
790 LDA digits
800 ASL A
810 TAY
820 .addloop2
830 LDA endaddr
840 CLC
850 ADC decdata,Y
860 STA endaddr
870 LDA endaddr+1
880 ADC decdata+1,Y
890 STA endaddr+1
900 DEX
910 BNE addloop2
920 .zero
930 PLA
940 TAY
950 INC digits
960 DEY
970 BPL addloop
980 LDA &18
990 STA pointer+1
1000 LDA #1
1010 STA pointer
1020 .findline
1030 LDY #0
1040 LDA (pointer),Y
1050 CMP #255
1060 BNE notend
1070 JMP error
1080 .notend
1090 CMP endaddr+1
1100 BNE nextline
1110 INY
1120 LDA (pointer),Y
1130 CMP endaddr
1140 BNE nextline
1150 LDA pointer
1160 STA startaddr
1170 LDA pointer+1
1180 STA startaddr+1
1190 JMP protect
1200 .nextline
1210 LDY #3
1220 .nextloop
1230 LDA (pointer),Y
1240 CMP #13
1250 BEQ foundnext
1260 INY
1270 JMP nextloop
1280 .foundnext
1290 INY
1300 TYA
1310 CLC
1320 ADC pointer
1330 STA pointer
1340 LDA pointer+1
1350 ADC #0
1360 STA pointer+1
1370 JMP findline
1380 .whichdigit
1390 SEC
1400 SBC #48
1410 CMP #11
1420 BCC ok
1430 JMP error
1440 .ok
1450 TAX
1460 RTS
1470 .decdata
1480 EQUW (1)
1490 EQUW (10)
1500 EQUW (100)
1510 EQUW (1000)
1520 EQUW (10000)
1530 .protect
1540 LDY #2
1550 LDA (startaddr),Y
1560 CLC
1570 ADC #1
1580 STA (startaddr),Y
1590 INY
1600 .findcr
1610 LDA (startaddr),Y
1620 CMP #13
1630 BEQ foundcr
1640 INY
1650 JMP findcr
1660 .foundcr
1670 TYA
1680 CLC
1690 ADC startaddr
1700 STA startaddr
1710 LDA startaddr+1
1720 ADC #0
1730 STA startaddr+1
1740 LDA &12
1750 STA pointer
1760 SEC
1770 SBC #1
1780 STA endaddr
1790 LDA &13
1800 SBC #0
1810 STA endaddr+1
1820 LDA &13
1830 STA pointer+1
1840 LDY #0
1850 .relocate
1860 LDA (endaddr),Y
1870 STA (pointer),Y
1880 LDA endaddr
1890 CMP startaddr
1900 BNE nextbyte
1910 LDA endaddr+1
1920 CMP startaddr+1
1930 BEQ insert21
1940 .nextbyte
1950 LDA endaddr
1960 SEC
1970 SBC #1
1980 STA endaddr
1990 LDA endaddr+1
2000 SBC #0
2010 STA endaddr+1
2020 LDA pointer
2030 SEC
2040 SBC #1
2050 STA pointer
2060 LDA pointer+1
2070 SBC #0
2080 STA pointer+1
2090 JMP relocate
2100 .insert21
2110 LDA #21
2120 STA (startaddr),Y
2130 INY
2140 LDA #13
2150 STA (startaddr),Y
2160 LDA &12
2170 SEC
2180 SBC #3
2190 STA pointer
2200 LDA &13
2210 SBC #0
2220 STA pointer+1
2230 LDY #0
2240 .crsearch
2250 LDA (pointer),Y
2260 CMP #13
2270 BEQ foundcr2
2280 LDA pointer
2290 SEC
2300 SBC #1
2310 STA pointer
2320 LDA pointer+1
2330 SBC #0
2340 STA pointer+1
2350 JMP crsearch
2360 .foundcr2
2370 LDY #3
2380 LDA (pointer),Y
2390 CLC
2400 ADC #1
2410 STA (pointer),Y
2420 LDA &12
2430 SEC
2440 SBC #1
2450 STA pointer
2460 LDA &13
2470 SBC #0
2480 STA pointer+1
2490 LDA #6
2500 LDY #0
2510 STA (pointer),Y
2520 LDA #13
2530 INY
```

Continued ▶

EIGHT BITS

◀ Continued

```
2540 STA (pointer),Y
2550 LDA #255
2560 INY
2570 STA (pointer),Y
2580 LDA &12
2590 CLC
2600 ADC #2
2610 STA &12
2620 LDA &13
2630 ADC #0
2640 STA &13
2650 RTS
2660 ]
2670 NEXT
2680 ENDPROC
```

Listing 3

```
10 REM Screen Blank (RAM version)
20 REM by Simon Young
30 REM for B/B+/M/C
40 REM (c) BAU Feb 91
50 :
60 oswrch=&FFEE
70 osasci=&FFE3
80 loeventv=&220
90 hieventv=&221
100 mode=&355
110 time=&05
120 char=&02
130 osbyte=&FFF4
140 osword=&FFF1
150 temp=&8F
160 FOR pass=0 TO 3 STEP 3
170 P%=&900
180 [OPT pass
190 LDY #&00
200 LDX #&4C
210 LDA #&F7
220 JSR osbyte
230 :
240 LDY #&00
250 LDX #break MOD256
260 LDA #&F8
270 JSR osbyte
280 :
290 LDY #&00
300 LDX #break DIV256
310 LDA #&F9
320 JSR osbyte
330 RTS
340 :
350 .break
360 PHP
370 PHA
380 TXA
390 PHA
400 TYA
410 PHA
420 BCS code
430 JMP end
440 :
450 .code
460 LDA #event MOD 256
470 STA loeventv
480 LDA #event DIV 256
490 STA hieventv
500 LDX #char
510 LDA #&0E
520 JSR osbyte
530 :
540 LDX #time
550 LDA #&0E
560 JSR osbyte
570 :
580 LDX #timetogo MOD 256
590 LDY #timetogo DIV 256
600 LDA #&04
610 JSR osword
620 :
630 .end
640 PLA
650 TAY
660 PLA
670 TAX
680 PLA
690 PLP
700 RTS
710 :
720 .event
730 PHP
740 PHA
750 STA temp
760 TXA
770 PHA
780 TYA
790 PHA
800 LDA temp
810 CMP #time
820 BEQ timeevent
830 CMP #char
840 BEQ charevent
850 JMP end
860 :
870 .timeevent
880 LDA #&D2
890 LDX #&01
900 LDY #&00
910 JSR osbyte
920 :
930 LDA #&07
940 CMP mode
950 BEQ blankseven
960 LDA #nsblankdata MOD 256
970 STA ploop+1
980 LDA #nsblankdata DIV 256
990 STA ploop+2
1000 JMP printer
1010 :
1020 .blankseven
1030 LDA #sblankdata MOD 256
1040 STA ploop+1
1050 LDA #sblankdata DIV 256
1060 STA ploop+2
1070 JMP printer
1080 :
1090 .charevent
1100 LDA #&D2
1110 LDX #&00
1120 LDY #&00
1130 JSR osbyte
1140 :
1150 LDX #timetogo MOD256
1160 LDY #timetogo DIV256
1170 LDA #&04
1180 JSR osword
1190 :
1200 LDA #&07
1210 CMP mode
1220 BEQ vis_seven
1230 LDA #nsdata MOD256
1240 STA ploop+1
1250 LDA #nsdata DIV256
1260 STA ploop+2
1270 JMP printer
1280 :
1290 .vis_seven
1300 LDA #sdata MOD 256
1310 STA ploop+1
1320 LDA #sdata DIV 256
1330 STA ploop+2
1340 JMP printer
1350 :
1360 .printer
1370 LDY #&00
1380 .ploop
1390 LDA data,Y
1400 JSR oswrch
1410 INY
1420 CPY #&0A
1430 BNE ploop
1440 JMP end
1450 :
1460 .data
1470 .sdata
1480 EQUB &17
1490 EQUB &00
1500 EQUB &08
1510 EQUB &93
1520 EQUW &0000
1530 EQUD &00000000
1540 :
1550 .nsdata
1560 EQUB &17
1570 EQUB &00
1580 EQUB &08
1590 EQUB &01
1600 EQUW &0000
1610 EQUD &00000000
1620 :
1630 .nsblankdata
1640 EQUB &17
1650 EQUB &00
1660 EQUB &08
1670 EQUB &F0
1680 EQUW &0000
1690 EQUD &00000000
1700 :
1710 .sblankdata
1720 EQUB &17
1730 EQUB &00
1740 EQUB &08
1750 EQUB &F3
1760 EQUW &0000
1770 EQUD &00000000
1780 :
1790 .timetogo
1800 EQUB &24
1810 EQUB &FA
1820 EQUB &FF
1830 EQUB &FF
1840 EQUB &FF
1850 ]
1860 NEXT
```

Listing 4

```
10 REM Screen Blank (ROM version)
20 REM by Simon Young
21 REM for B/B+/M/C with Sideways RAM
/BASIC II
22 REM (c) BAU Feb 91
30 :
50 atemp=&70
60 xtemp=&71
70 ytemp=&72
80 apos=&73
90 xpos=&74
100 ypos=&75
110 astore=&76
120 xstore=&77
130 ystore=&78
140 loloc=&79
150 hiloc=&7A
160 long=&7B
170 matchpot=&7C
180 typematch=&7D
190 :
210 osbyte=&FFF4
220 osword=&FFF1
230 gsinit=&FFC2
240 gsread=&FFC5
250 osasci=&FFE3
260 :
280 mode=&355
290 time=&05
300 char=&02
320 :
330 FOR pass=4 TO 7 STEP 3
340 P%=&8000
350 O%=&4000
360 [OPT pass
400 BRK
401 BRK
402 BRK
410 JMP service
420 EQUB &82
430 EQUB nn MOD256
440 EQUB &01
450 EQUS "Screen Blank"
460 .nn
470 EQUB &00
480 EQUS "(C)Simon Anthony Young 1990"
490 EQUB &00
491 :
530 .service
540 :
550 .shove
560 PHA
570 TXA
571 PHA
580 TYA
581 PHA
590 TSX
600 INX
610 LDY #&8F
620 .store
621 LDA &0000,Y
630 PHA
640 DEY
650 CPY #&6F
660 BNE store
670 :
680 LDA &0100,X
681 STA ytemp
682 STX ypos
690 INX
700 LDA &0100,X
701 STA xtemp
702 STX xpos
710 INX
720 LDA &0100,X
721 STA atemp
722 STX apos
730 :
740 LDA atemp
750 LDX xtemp
760 LDY ytemp
780 :
790 .destination
800 CMP #&09
801 BEQ servhelp
810 CMP #&03
811 BEQ servboot
820 CMP #&04
821 BEQ servstar
830 :
840 .pull
850 LDA atemp
851 LDX apos
852 STA &0100,X
860 LDA xtemp
861 LDX xpos
862 STA &0100,X
870 LDA ytemp
871 LDX ypos
872 STA &0100,X
880 LDY #&70
890 .restore
891 PLA
900 STA &0000,Y
910 INY
920 CPY #&90
930 BNE restore
940 PLA
941 TAY
950 PLA
951 TAX
960 PLA
970 RTS
980 :
990 .servhelp
1000 SEC
1010 JSR gsinit
1020 BEQ respond
1030 LDA #strblank MOD 256
1031 STA loloc
1040 LDA #strblank DIV 256
1041 STA hiloc
1050 CLC
1060 JSR matchch
1070 BCC pull
1080 LDA #messblank MOD 256
1081 STA loloc
1090 LDA #messblank DIV 256
1091 STA hiloc
1100 JSR wrch
1110 LDA #&00
1111 STA atemp
1120 JMP pull
1130 :
1140 .respond
1150 LDA #messbasic MOD 256
1151 STA loloc
1160 LDA #messbasic DIV 256
1161 STA hiloc
1170 JSR wrch
1180 JMP pull
1200 :
1210 .servboot
1220 LDA #messboot MOD 256
1221 STA loloc
1230 LDA #messboot DIV 256
1231 STA hiloc
1240 JSR wrch
1250 JMP blankon
1270 :
1280 .servstar
1290 LDA #strblankon MOD 256
1291 STA loloc
1300 LDA #strblankon DIV 256
1301 STA hiloc
1310 LDY ytemp
1320 SEC
1330 JSR matchch
1340 BCS blankon
1350 :
1360 LDA #strblankoff MOD 256
1361 STA loloc
1370 LDA #strblankoff DIV 256
1371 STA hiloc
1380 LDY ytemp
1390 SEC
1400 JSR matchch
1410 BCS blankoff
1430 JMP pull
1450 :
1460 .blankon
1480 LDA #&30
1481 STA &0220
1490 LDA #&FF
1491 STA &0221
1500 LDX #&00
1510 LDY #&FF
1520 LDA #&A8
1530 JSR osbyte
1540 STX loloc
1550 STY hiloc
1560 LDY #&30
1570 LDA #event MOD 256
1571 STA (loloc),Y
1580 INY
1590 LDA #event DIV 256
1591 STA (loloc),Y
1600 INY
1610 LDA xtemp
1611 STA (loloc),Y
1620 :
1640 LDX #char
1650 LDA #&0E
1660 JSR osbyte
1670 LDX #time
1680 LDA #&0E
1690 JSR osbyte
1700 :
1720 LDX #timetogo MOD 256
1730 LDY #timetogo DIV 256
1740 LDA #&04
1750 JSR osword
1760 LDA atemp
1770 CMP #&03
1780 BNE norm
1790 JMP pull
1800 .norm
1810 LDA #&00
1811 STA atemp
1820 JMP pull
1840 :
1850 .blankoff
1870 LDX #char
1880 LDA #&0D
1890 JSR osbyte
1900 LDX #time
1910 LDA #&0D
1920 JSR osbyte
1930 LDA #&00
1931 STA atemp
1940 JMP pull
1950 :
1970 .event
1980 PHA
```

Continued ▶

◀ Continued

```
1990 TXA
1991 PHA
2000 TYA
2001 PHA
2010 TSX
2020 INX
2030 LDY #&8F
2040 .store
2041 LDA &0000,Y
2050 PHA
2060 DEY
2070 CPY #&6F
2080 BNE store
2090 LDA &0100,X
2091 STA ytemp
2092 STX ypos
2100 INX
2110 LDA &0100,X
2111 STA xtemp
2112 STX xpos
2120 INX
2130 LDA &0100,X
2131 STA atemp
2132 STX apos
2140 :
2150 LDA atemp
2160 LDX xtemp
2170 LDY ytemp
2180 :
2190 CMP #char
2191 BEQ charevent
2200 CMP #time
2201 BEQ timeevent
2210 JMP pull
2220 :
2240 .charevent
2270 LDA #&D2
2280 LDX #&00
2290 LDY #&00
2300 JSR osbyte
2320 :
2340 LDX #timetogo MOD 256
2350 LDY #timetogo DIV 256
2360 LDA #&04
2370 JSR osword
2380 :
2400 LDA #&07
2410 CMP mode
2420 BEQ seven
2430 :
2440 .notseven
2450 LDA #nsdata MOD 256:STA loloc
2460 LDA #nsdata DIV 256:STA hiloc
2470 JSR wrch
2480 JMP pull
2490 :
2500 .seven
2510 LDA #sdata MOD 256
2511 STA loloc
2520 LDA #sdata DIV 256
2521 STA hiloc
2530 JSR wrch
2540 JMP pull
2560 :
2570 .timeevent
2600 LDA #&D2
2610 LDX #&01
2620 LDY #&00
2630 JSR osbyte
2640 :
2660 LDA #&07
2670 CMP mode
2680 BEQ sevblack
2690 LDA #blkdata MOD 256
2691 STA loloc
2700 LDA #blkdata DIV 256
2701 STA hiloc
2710 JSR wrch
2720 JMP pull
2730 .sevblack
2740 LDA #sblnkdata MOD 256
2741 STA loloc
2750 LDA #sblnkdata DIV 256
2751 STA hiloc
2760 JSR wrch
2770 JMP pull
2800 :
2810 .matchch
2820 STA astore
2830 STX xstore
2840 :
2850 LDA #&00
2851 STA typematch
2860 ADC typematch
2861 STA typematch
2870 LDX #&00
2880 LDA (loloc,X)
2881 STA long
2890 LDA loloc
2891 TAX
2900 TYA
2901 STA loloc
2910 TXA
2920 SEC
2930 SBC loloc
2931 STA loloc
2940 BCS nocar
2950 DEC hiloc
2960 .nocar
2970 :
2980 CLC
2990 LDA #&01
3000 ADC loloc
3001 STA loloc
3010 LDA #&00
3020 ADC hiloc
3021 STA hiloc
3030 :
3040 LDX #&00
3050 .compare
3055 INX
3060 LDA (loloc),Y
3070 STA matchpot
3080 JSR gsread
3090 BCS endstr
3100 AND #&DF
3110 CMP matchpot
3120 BEQ compare
3130 CMP #ASC(".") AND &DF
3140 BNE nomatch
3150 LDA typematch
3160 BNE nomatch
3170 TXA
3180 CMP #&04
3190 BCC nomatch
3200 TAY
3210 DEY
3220 LDX xstore
3230 LDY ystore
3240 SEC
3250 RTS
3260 :
3270 .nomatch
3280 TXA
3281 TAY
3290 DEY
3300 LDX xstore
3310 LDA astore
3320 CLC
3330 RTS
3340 :
3350 .endstr
3360 TXA
3370 CMP long
3380 BCC nomatch
3390 LDY long
3400 LDX xstore
3410 LDA astore
3420 SEC
3430 RTS
3450 :
3460 .wrch
3470 STA astore
3480 STX xstore
3490 STY ystore
3500 :
3510 LDY #&00
3520 LDA (loloc),Y
3530 TAX
3540 INY
3550 .vdu
3551 LDA (loloc),Y
3560 JSR osasci
3570 INY
3580 DEX
3590 BNE vdu
3600 :
3610 LDA astore
3620 LDX xstore
3630 LDY ystore
3640 RTS
3650 :
3660 .strblank
3670 EQUB &05
3680 EQUS "BLANK"
3690 EQUB &00
3700 :
3710 .strblankon
3720 EQUB &07
3730 EQUS "BLANKON"
3740 EQUB &00
3750 :
3760 .strblankoff
3770 EQUB &08
3780 EQUS "BLANKOFF"
3790 EQUB &00
3800 :
3810 .messblank
3820 EQUB &29
3830 EQUB &0D
3840 EQUS "SAY Screen Blanker"
3850 EQUB &0D
3860 EQUS "  BLANKON"
3870 EQUB &0D
3880 EQUS "  BLANKOFF"
3890 EQUB &0D
3900 EQUB &00
3910 :
3920 .messbasic
3930 EQUB &07
3940 EQUB &0D
3950 EQUS "BLANK"
3960 EQUB &0D
3970 :
3980 .messboot
3990 EQUB &14
4000 EQUS "SAY Screen Blanker"
4010 EQUB &0D
4020 EQUB &0D
4030 :
4040 :
4050 .timetogo
4060 EQUB &24
4070 EQUB &FA
4080 EQUB &FF
4090 EQUB &FF
4100 EQUB &FF
4110 :
4120 .nsdata
4130 EQUB &0A
4140 EQUB &17
4150 EQUB &00
4160 EQUB &08
4170 EQUB &01
4180 EQUW &0000
4190 EQUD &00000000
4200 :
4210 .sdata
4220 EQUB &0A
4230 EQUB &17
4240 EQUB &00
4250 EQUB &08
4260 EQUB &93
4270 EQUW &0000
4280 EQUD &00000000
4290 :
4300 .blkdata
4310 EQUB &0A
4320 EQUB &17
4330 EQUB &00
4340 EQUB &08
4350 EQUB &F1
4360 EQUW &0000
4370 EQUD &00000000
4380 .sblnkdata
4390 EQUB &0A
4400 EQUB &17
4410 EQUB &00
4420 EQUB &08
4430 EQUB &F3
4440 EQUW &0000
4450 EQUD &00000000
4480 ]
4490 NEXT
```

Listing 5

```
10 REM Screen Bank (WE ROM/RAM board)
20 REM by Simon Young
30 REM for B/B+ with WE ROM/RAM board
40 REM (c) BAU Feb 91
50 :
60 atemp=&70
70 xtemp=&71
80 ytemp=&72
90 apos=&73
100 xpos=&74
110 ypos=&75
120 astore=&76
130 xstore=&77
140 ystore=&78
150 loloc=&79
160 hiloc=&7A
170 long=&7B
180 matchpot=&7C
190 typematch=&7D
200 :
210 osbyte=&FFF4
220 osword=&FFF1
230 gsinit=&FFC2
240 gsread=&FFC5
250 osasci=&FFE3
260 :
270 mode=&355
280 time=&05
290 char=&02
300 :
310 ?&FF3E=0
320 FOR pass=0 TO 3 STEP 3
330 P%=&8000
340 [OPT pass
350 BRK
360 BRK
370 BRK
380 JMP service
390 EQUB &82
400 EQUB nn MOD256
410 EQUB &01
420 EQUS "Screen Blank"
430 .nn
440 EQUB &00
450 EQUS "(C)Simon Anthony Young 1990"
460 EQUB &00
470 .service
480 .shove
490 PHA
500 TXA
510 PHA
520 TYA
530 PHA
540 TSX
550 INX
560 LDY #&8F
570 .store
580 LDA &0000,Y
590 PHA
600 DEY
610 CPY #&6F
620 BNE store
630 :
640 LDA &0100,X
650 STA ytemp
660 STX ypos
670 INX
680 LDA &0100,X
690 STA xtemp
700 STX xpos
710 INX
720 LDA &0100,X
730 STA atemp
740 STX apos
750 :
760 LDA atemp
770 LDX xtemp
780 LDY ytemp
790 :
800 .destination
810 CMP #&09
820 BEQ servhelp
830 CMP #&03
840 BEQ servboot
850 CMP #&04
860 BEQ servstar
870 :
880 .pull
890 LDA atemp
900 LDX apos
910 STA &0100,X
920 LDA xtemp
930 LDX xpos
940 STA &0100,X
950 LDA ytemp
960 LDX ypos
970 STA &0100,X
980 LDY #&70
990 .restore
1000 PLA
1010 STA &0000,Y
1020 INY
1030 CPY #&90
1040 BNE restore
1050 PLA
1060 TAY
1070 PLA
1080 TAX
1090 PLA
1100 RTS
1110 :
1120 .servhelp
1130 SEC
1140 JSR gsinit
1150 BEQ respond
1160 LDA #strblank MOD 256
1170 STA loloc
1180 LDA #strblank DIV 256
1190 STA hiloc
1200 CLC
1210 JSR matchch
1220 BCC pull
1230 LDA #messblank MOD 256
1240 STA loloc
1250 LDA #messblank DIV 256
1260 STA hiloc
1270 JSR wrch
1280 LDA #&00
1290 STA atemp
1300 JMP pull
1310 :
1320 .respond
1330 LDA #messbasic MOD 256
1340 STA loloc
1350 LDA #messbasic DIV 256
1360 STA hiloc
1370 JSR wrch
1380 JMP pull
1390 :
1400 .servboot
1410 LDA #messboot MOD 256
1420 STA loloc
1430 LDA #messboot DIV 256
1440 STA hiloc
1450 JSR wrch
1460 JMP blankon
1470 :
1480 .servstar
1490 LDA #strblankon MOD 256
1500 STA loloc
1510 LDA #strblankon DIV 256
1520 STA hiloc
1530 LDY ytemp
1540 SEC
1550 JSR matchch
1560 BCS blankon
1570 :
1580 LDA #strblankoff MOD 256
1590 STA loloc
1600 LDA #strblankoff DIV 256
1610 STA hiloc
1620 LDY ytemp
1630 SEC
1640 JSR matchch
1650 BCS blankoff
1660 JMP pull
```

Continued ▶

EIGHT BITS

◀ Continued

```
1670 :
1680 .blankon
1690 LDA #&30
1700 STA &0220
1710 LDA #&FF
1720 STA &0221
1730 LDX #&00
1740 LDY #&FF
1750 LDA #&A8
1760 JSR osbyte
1770 STX loloc
1780 STY hiloc
1790 LDY #&30
1800 LDA #event MOD 256
1810 STA (loloc),Y
1820 INY
1830 LDA #event DIV 256
1840 STA (loloc),Y
1850 INY
1860 LDA xtemp
1870 STA (loloc),Y
1880 :
1890 LDX #char
1900 LDA #&0E
1910 JSR osbyte
1920 LDX #time
1930 LDA #&0E
1940 JSR osbyte
1950 :
1960 LDX #timetogo MOD 256
1970 LDY #timetogo DIV 256
1980 LDA #&04
1990 JSR osword
2000 LDA atemp
2010 CMP #&03
2020 BNE norm
2030 JMP pull
2040 .norm
2050 LDA #&00
2060 STA atemp
2070 JMP pull
2080 :
2090 .blankoff
2100 LDX #char
2110 LDA #&0D
2120 JSR osbyte
2130 LDX #time
2140 LDA #&0D
2150 JSR osbyte
2160 LDA #&00
2170 STA atemp
2180 JMPpull
2190 :
2200 .event
2210 PHA
2220 TXA
2230 PHA
2240 TYA
2250 PHA
2260 TSX
2270 INX
2280 LDY #&8F
2290 .store
2300 LDA &0000,Y
2310 PHA
2320 DEY
2330 CPY #&6F
2340 BNE store
2350 LDA &0100,X
2360 STA ytemp
2370 STX ypos
2380 INX
2390 LDA &0100,X
2400 STA xtemp
2410 STX xpos
2420 INX
2430 LDA &0100,X
2440 STA atemp
2450 STX apos
2460 :
2470 LDA atemp
2480 LDX xtemp
2490 LDY ytemp
2500 :
2510 CMP #char
2520 BEQ charevent
2530 CMP #time
2540 BEQ timeevent
2550 JMP pull
2560 :
2570 .charevent
2580 LDA #&D2
2590 LDX #&00
2600 LDY #&00
2610 JSR osbyte
2620 :
2630 LDX #timetogo MOD 256
2640 LDY #timetogo DIV 256
2650 LDA #&04
2660 JSR osword
2670 :
2680 LDA #&07
2690 CMP mode
2700 BEQ seven
2710 :
2720 .notseven
2730 LDA #nsdata MOD 256
2740 STA loloc
2750 LDA #nsdata DIV 256
2760 STA hiloc
2770 JSR wrch
2780 JMP pull
2790 :
2800 .seven
2810 LDA #sdata MOD 256
2820 STA loloc
2830 LDA #sdata DIV 256
2840 STA hiloc
2850 JSR wrch
2860 JMP pull
2870 :
2880 .timeevent
2890 LDA #&D2
2900 LDX #&01
2910 LDY #&00
2920 JSR osbyte
2930 :
2940 LDA #&07
2950 CMP mode
2960 BEQ sevblack
2970 LDA #blkdata MOD 256
2980 STA loloc
2990 LDA #blkdata DIV 256
3000 STA hiloc
3010 JSR wrch
3020 JMP pull
3030 .sevblack
3040 LDA #sblnkdata MOD 256
3050 STA loloc
3060 LDA #sblnkdata DIV 256
3070 STA hiloc
3080 JSR wrch
3090 JMP pull
3100 :
3110 .matchch
3120 STA astore
3130 STX xstore
3140 LDA #&00
3150 STA typematch
3160 ADC typematch
3170 STA typematch
3180 LDX #&00
3190 LDA (loloc,X)
3200 STA long
3210 LDA loloc
3220 TAX
3230 TYA
3240 STA loloc
3250 TXA
3260 SEC
3270 SBC loloc
3280 STA loloc
3290 BCS nocar
3300 DEC hiloc
3310 .nocar
3320 :
3330 CLC
3340 LDA #&01
3350 ADC loloc
3360 STA loloc
3370 LDA #&00
3380 ADC hiloc
3390 STA hiloc
3400 :
3410 LDX #&00
3420 .compare
3430 INX
3440 LDA (loloc),Y
3450 STA matchpot
3460 JSR gsread
3470 BCS endstr
3480 AND #&DF
3490 CMP matchpot
3500 BEQ compare
3510 CMP #ASC(".") AND &DF
3520 BNE nomatch
3530 LDA typematch
3540 BNE nomatch
3550 TXA
3560 CMP #&04
3570 BCC nomatch
3580 TAY
3590 DEY
3600 LDX xstore
3610 LDY ystore
3620 SEC
3630 RTS
3640 :
3650 .nomatch
3660 TXA
3670 TAY
3680 DEY
3690 LDX xstore
3700 LDA astore
3710 CLC
3720 RTS
3730 :
3740 .endstr
3750 TXA
3760 CMP long
3770 BCC nomatch
3780 LDY long
3790 LDX xstore
3800 LDA astore
3810 SEC
3820 RTS
3830 :
3840 .wrch
3850 STA astore
3860 STX xstore
3870 STY ystore
3880 :
3890 LDY #&00
3900 LDA (loloc),Y
3910 TAX
3920 INY
3930 .vdu
3940 LDA (loloc),Y
3950 JSR osasci
3960 INY
3970 DEX
3980 BNE vdu
3990 :
4000 LDA astore
4010 LDX xstore
4020 LDY ystore
4030 RTS
4040 :
4050 .strblank
4060 EQUB &05
4070 EQUS "BLANK"
4080 EQUB &00
4090 :
4100 .strblankon
4110 EQUB &07
4120 EQUS "BLANKON"
4130 EQUB &00
4140 :
4150 .strblankoff
4160 EQUB &08
4170 EQUS "BLANKOFF"
4180 EQUB &00
4190 :
4200 .messblank
4210 EQUB &29
4220 EQUB &0D
4230 EQUS "SAY Screen Blanker"
4240 EQUB &0D
4250 EQUS "  BLANKON"
4260 EQUB &0D
4270 EQUS "  BLANKOFF"
4280 EQUB &0D
4290 EQUB &00
4300 :
4310 .messbasic
4320 EQUB &07
4330 EQUB &0D
4340 EQUS "BLANK"
4350 EQUB &0D
4360 :
4370 .messboot
4380 EQUB &14
4390 EQUS "SAY Screen Blanker"
4400 EQUB &0D
4410 EQUB &0D
4420 :
4430 .timetogo
4440 EQUB &24
4450 EQUB &FA
4460 EQUB &FF
4470 EQUB &FF
4480 EQUB &FF
4490 :
4500 .nsdata
4510 EQUB &0A
4520 EQUB &17
4530 EQUB &00
4540 EQUB &08
4550 EQUB &01
4560 EQUW &0000
4570 EQUD &00000000
4580 :
4590 .sdata
4600 EQUB &0A
4610 EQUB &17
4620 EQUB &00
4630 EQUB &08
4640 EQUB &93
4650 EQUW &0000
4660 EQUD &00000000
4670 :
4680 .blkdata
4690 EQUB &0A
4700 EQUB &17
4710 EQUB &00
4720 EQUB &08
4730 EQUB &F1
4740 EQUW &0000
4750 EQUD &00000000
4760 :
4770 .sblnkdata
4780 EQUB &0A
4790 EQUB &17
4800 EQUB &00
4810 EQUB &08
4820 EQUB &F3
4830 EQUW &0000
4840 EQUD &00000000
4850 :
4860 ]
4870 NEXT
4880 ?&FF38=0
```

LORENZ ATTRACTOR

Listing 1

```
10 REM >Lorenz
20 REM Animated Lorenz attractor
30 REM by Michael Attenborough
40 REM for Archimedes with RISC OS on
ly
50 REM (C) BAU Febuary 1991
60 :
70 ON ERROR GOTO 1830
80 MODE 8+128
90 PRINT"Select display of (1) animat
ed points or (2) just attractor"
100 REPEAT
110 ST%=GET-48
120 UNTIL ST%=1 OR ST%=2
130 :
140 PROCinit
150 IF ST%=2 THEN PROCattr ELSE
160 PROCbackg
170 ON ERROR IF ERR<>17 GOTO 1830
180 REPEAT
190 PROCmenu
200 PROCmove
210 UNTIL exit%
220 ENDIF
230 MODE 0
240 END
250 :
260 DEF PROCinit
270 SYS "Hourglass_On"
280 shift%=20
290 T%=2^shift%
300 DIM per% 61*4*64
310 PRINT''"Setting up perspective arr
ay"
320 FOR N%=0 TO 60*64
330 Z=(N%/64)-30
340 per%!(N%*4)=T%*20/((Z*20/4096)+1)
350 NEXT
360 DIM co% 12*450
370 PROCassem
380 ENDPROC
390 :
400 DEF PROCbackg
410 ORIGIN 640,512
420 OFF
430 COLOUR 1,0,0,200
440 ssize%=24820
450 DIM max% -1
460 max%=(HIMEM-max%-1000) DIV ssize%
470 IF max%=0 THEN PRINT"Not enough me
mory for background sprites: check Sprit
eSize is 0":END
480 space=max%*ssize%+300
490 astep=5:IF max%>72 THEN astep=360/
max%
500 DIM spr space
510 !spr=space
520 spr!4=0
530 spr!8=16
540 spr!12=16
550 DIM cos%(max%),sin%(max%)
560 ang%=(max%+1) DIV 2
570 A%=ang%
580 rot=-50
590 :
600 REPEAT
610 cos%(A%)=T%*COSRAD(rot)
620 sin%(A%)=T%*SINRAD(rot)
630 A%-=1:rot-=astep
640 UNTIL A%=0
650 A%=ang%+1:rot=-50+astep
660 WHILE A%<=max%
670 cos%(A%)=T%*COSRAD(rot)
680 sin%(A%)=T%*SINRAD(rot)
690 A%+=1:rot+=astep
700 ENDWHILE
710 :
720 GCOL 1
730 FOR A%=1 TO max%
740 CLS
750 SYS "Hourglass_Percentage",(100*(A
%-1)) DIV max%
760 !Xin=-9.96122429*T%
770 !Yin=-10.3590104*T%
780 !Zin=28.4523924*T%
```

Continued ▶

LORENZ ATTRACTOR

◀ Continued

```
790 !dots=3000
800 !cos=cos%(A%):!sin=sin%(A%)
810 CALL line
820 SYS "OS_SpriteOp",16+256,spr,STR$(A%),0,-520,-360,520,364
830 NEXT
840 !cos=cos%(ang%):!sin=sin%(ang%)
850 SYS "Hourglass_Off"
860 ENDPROC
870 :
880 DEF PROCmenu
890 *FX 112,0
900 *FX 113,0
910 CLS
920 PRINT''"Which starting point distribution?"
930 PRINT'"1/  Cube"
940 PRINT'"2/  Line"
950 PRINT'"3/  Loose bunch"
960 PRINT'"4/  Tight bunch"
970 PRINT''"press 1-4 (0 to exit) :";
980 REPEAT:ST%=GET-48:UNTIL ST%>=0 AND ST%<5
990 VDU ST%+48
1000 exit%=(ST%=0)
1010 IF exit% THEN ENDPROC
1020 SYS "Hourglass_On"
1030 PRINT''"Setting up initial points"
1040 ad%=co%
1050 CASE ST% OF
1060 WHEN 1:
1070 !dots=4*(36+41+33)
1080 :
1090 FOR N%=0 TO 35
1100 !ad%=T%*17:ad%!4=T%*21:ad%!8=T%*(N%+9):ad%+=12
1110 !ad%=T%*17:ad%!4=T%*-21:ad%!8=T%*(N%+9):ad%+=12
1120 !ad%=T%*-17:ad%!4=T%*21:ad%!8=T%*(N%+9):ad%+=12
1130 !ad%=T%*-17:ad%!4=T%*-21:ad%!8=T%*(N%+9):ad%+=12
1140 NEXT
1150 :
1160 FOR N%=1 TO 41
1170 !ad%=T%*17:ad%!4=T%*(N%-21):ad%!8=T%*9:ad%+=12
1180 !ad%=T%*-17:ad%!4=T%*(N%-21):ad%!8=T%*9:ad%+=12
1190 !ad%=T%*17:ad%!4=T%*(N%-21):ad%!8=T%*44:ad%+=12
1200 !ad%=T%*-17:ad%!4=T%*(N%-21):ad%!8=T%*44:ad%+=12
1210 NEXT
1220 FOR N%=1 TO 33
1230 !ad%=T%*(N%-17):ad%!4=T%*21:ad%!8=T%*9:ad%+=12
1240 !ad%=T%*(N%-17):ad%!4=T%*-21:ad%!8=T%*9:ad%+=12
1250 !ad%=T%*(N%-17):ad%!4=T%*21:ad%!8=T%*44:ad%+=12
1260 !ad%=T%*(N%-17):ad%!4=T%*-21:ad%!8=T%*44:ad%+=12
1270 NEXT
1280 :
1290 WHEN 2:
1300 !dots=70
1310 FOR N%=0 TO 69
1320 !ad%=T%*17:ad%!4=T%*21:ad%!8=T%*(N%*(35/70)+9):ad%+=12
1330 NEXT
1340 :
1350 WHEN 3:
1360 !dots=100
1370 FOR N%=0 TO 99
1380 !ad%=T%*(16+2*RND(1))
1390 ad%!4=T%*(20+2*RND(1))
1400 ad%!8=T%*(8+2*RND(1))
1410 ad%+=12
1420 NEXT
1430 :
1440 WHEN 4:
1450 !dots=100
1460 FOR N%=0 TO 99
1470 !ad%=T%*(17+.01*RND(1))
1480 ad%!4=T%*(21+.01*RND(1))
1490 ad%!8=T%*(9+.01*RND(1))
1500 ad%+=12
1510 NEXT
1520 ENDCASE
1530 SYS "Hourglass_Off"
1540 ENDPROC
1550 :
1560 DEF PROCmove
1570 IF exit% THEN ENDPROC
1580 PROCswap
1590 CLS
1600 PROCswap
1610 CLS
1620 GCOL 7
1630 :
1640 REPEAT
1650 PROCswap
1660 IF INKEY(-26) AND ang%>1 THEN ang%-=1:!cos=cos%(ang%):!sin=sin%(ang%)
1670 IF INKEY(-122) AND ang%<max% THEN ang%+=1:!cos=cos%(ang%):!sin=sin%(ang%)
1680 CLS:SYS "OS_SpriteOp",34+256,spr,STR$(ang%),-520,-360,0
1690 CALL drawpoints
1700 PRINTTAB(20,0);"Press space to start"
1710 UNTIL INKEY(-99)
1720 :
1730 REPEAT
1740 PROCswap
1750 IF INKEY(-26) AND ang%>1 THEN ang%-=1:!cos=cos%(ang%):!sin=sin%(ang%)
1760 IF INKEY(-122) AND ang%<max% THEN ang%+=1:!cos=cos%(ang%):!sin=sin%(ang%)
1770 CLS
1780 SYS "OS_SpriteOp",34+256,spr,STR$(ang%),-520,-360,0
1790 CALL movepoints
1800 UNTIL FALSE
1810 ENDPROC
1820 :
1830 ON ERROR OFF
1840 MODE 0
1850 SYS "Hourglass_Smash"
1860 PRINT REPORT$;" at line ";ERL
1870 END
1880 :
1890 DEF PROCswap
1900 IF B%=2 THEN
1910 B%=1:*FX 112,1
1920 WAIT:*FX 113,2
1930 ELSE
1940 B%=2:*FX 112,2
1950 WAIT:*FX 113,1
1960 ENDIF
1970 ENDPROC
1980 :
1990 DEF PROCassem
2000 LOCAL P%
2010 cspace=1350
2020 DIM code cspace
2030 X%=1:Y%=2:Z%=3:A%=0:B%=4:C%=5:D%=6:E%=7
2040 AD%=8:PR%=9:N%=10:CS%=11:SN%=12
2050 link=14:sp=13:pc=15
2060 :
2070 FOR pass%=0 TO 2 STEP 2
2080 P%=code
2090 [OPT pass%
2100 ALIGN
2110 :
2120 .drawpoints
2130 STMFD (sp)!,{link}
2140 LDR N%,dots
2150 LDR AD%,copos%
2160 :
2170 .drawloop
2180 LDMIA (AD%)!,{X%,Y%,Z%}
2190 MOV A%,#69
2200 BL plot
2210 SUBS N%,N%,#1
2220 BNE drawloop
2230 MOV N%,#1
2240 ADDS N%,N%,#1
2250 LDMFD (sp)!,{pc}
2260 :
2270 .movepoints
2280 STMFD (sp)!,{link}
2290 LDR N%,dots
2300 LDR AD%,copos%
2310 :
2320 .mainloop
2330 LDMIA AD%,{X%,Y%,Z%}
2340 BL func
2350 STMIA (AD%)!,{X%,Y%,Z%}
2360 MOV A%,#69
2370 BL plot
2380 SUBS N%,N%,#1
2390 BNE mainloop
2400 MOV N%,#1
2410 ADDS N%,N%,#1
2420 LDMFD (sp)!,{pc}
2430 :
2440 .plot
2450 STMFD (sp)!,{link}
2460 SUB Z%,Z%,#T%*26.5
2470 :
2480 LDR SN%,sin
2490 LDR CS%,cos
2500 FNmult(X%,CS%,B%,E%,C%,D%)
2510 FNmult(Y%,SN%,B%,E%,C%,PR%)
2520 SUB PR%,D%,PR%
2530 FNmult(X%,SN%,B%,E%,C%,D%)
2540 MOV X%,PR%
2550 FNmult(Y%,CS%,B%,E%,C%,PR%)
2560 ADD Y%,D%,PR%
2570 :
2580 ADDS Y%,Y%,#T%*30
2590 MOVMI Y%,#0
2600 MOV Y%,Y%,ASR#(shift%-6)
2610 CMP Y%,#60*64
2620 MOVGE Y%,#(60*64)
2630 LDR PR%,perpos%
2640 LDR Y%,[PR%,Y%,ASL#2]
2650 FNmult(X%,Y%,B%,E%,C%,D%)
2660 MOV X%,D%,ASR#shift%
2670 FNmult(Z%,Y%,B%,E%,C%,D%)
2680 MOV Y%,D%,ASR#shift%
2690 SWI "OS_Plot"
2700 LDMFD (sp)!,{pc}
2710 :
2720 .line
2730 STMFD (sp)!,{link}
2740 LDR N%,dots
2750 ADR AD%,Xin
2760 LDMIA AD%,{X%,Y%,Z%}
2770 MOV A%,#4
2780 BL plot
2790 .sloop
2800 LDMIA AD%,{X%,Y%,Z%}
2810 BL func
2820 STMIA AD%,{X%,Y%,Z%}
2830 MOV A%,#5
2840 BL plot
2850 SUBS N%,N%,#1
2860 BNE sloop
2870 MOV N%,#1
2880 ADDS N%,N%,#1
2890 LDMFD (sp)!,{pc}
2900 :
2910 .func
2920 STMFD (sp)!,{link}
2930 SUB A%,Y%,X%
2940 ADD A%,A%,A%,ASL#2
2950 MOV A%,A%,ASR#6
2960 ADD X%,X%,A%
2970 :
2980 RSB A%,Z%,#28*T%
2990 FNmult(A%,X%,B%,E%,C%,D%)
3000 SUB A%,D%,Y%
3010 ADD Y%,Y%,A%,ASR#7
3020 :
3030 FNmult(X%,Y%,B%,E%,C%,D%)
3040 SUB A%,D%,Z%,ASL #1
3050 ADD Z%,Z%,A%,ASR#7
3060 LDMFD (sp)!,{pc}
3070 :
3080 .mask EQUD &FFFF
3090 .dots EQUD 0
3100 .copos% EQUD co%
3110 .perpos% EQUD per%
3120 .sin EQUD 0
3130 .cos EQUD 0
3140 .storeX EQUD 0
3150 .storeY EQUD 0
3160 .Xin EQUD 0
3170 .Yin EQUD 0
3180 .Zin EQUD 0
3190 ]
3200 IF P%>code+cspace THEN ERROR 1234,"Out of room for code"
3210 NEXT pass%
3220 ENDPROC
3230 :
3240 DEF FNmult(X,Y,T,S,H,L)
3250 [OPT pass%
3260 STR X,storeX
3270 STR Y,storeY
3280 MOV S,#0
3290 CMP X,#0
3300 RSBLT X,X,#0
3310 MVNLT S,S
3320 CMP Y,#0
3330 RSBLT Y,Y,#0
3340 MVNLT S,S
3350 MOV T,X,LSR #16
3360 MOV H,Y,LSR #16
3370 LDR L,mask
3380 AND X,X,L:AND Y,Y,L
3390 MUL L,X,Y
3400 MUL Y,T,Y
3410 MUL X,H,X
3420 MUL H,T,H
3430 ADDS X,Y,X
3440 ADDCS H,H,#&10000
3450 ADDS L,L,X,LSL #16
3460 ADC H,H,X,LSR #16
3470 MOV L,L,LSR #shift%
3480 MOV T,H,LSL #(32-shift%)
3490 ORR L,L,T
3500 MOV H,H,ASR #shift%
3510 CMP S,#0
3520 RSBNE L,L,#0
3530 RSBNE H,H,#0
3540 LDR X,storeX
3550 LDR Y,storeY
3560 ]
3570 =0
3580 :
3590 DEF PROCattr
3600 ON ERROR IF ERR<>17 GOTO 1830 ELSE GOTO 230
3610 MODE 0
3620 ORIGIN 640,512
3630 OFF
3640 ssize%=13200
3650 DIM max% -1
3660 max%=(HIMEM-max%-1000) DIV ssize%
3670 IF max%=0 THEN PRINT"Not enough memory for background sprites: check SpriteSize is 0":END
3680 space=max%*ssize%+300
3690 DIM spr space
3700 !spr=space
3710 spr!4=0
3720 spr!8=16
3730 spr!12=16
3740 :
3750 FOR A%=1 TO max%
3760 CLS
3770 SYS "Hourglass_Percentage",(100*(A%-1)) DIV max%
3780 !Xin=-9.96122429*T%
3790 !Yin=-10.3590104*T%
3800 !Zin=28.4523924*T%
3810 !dots=4000
3820 !cos=T%*COS(2*PI*A%/max%)
3830 !sin=T%*SIN(2*PI*A%/max%)
3840 CALL line
3850 SYS "OS_SpriteOp",16+256,spr,STR$(A%),0,-520,-360,520,364
3860 NEXT
3870 :
3880 SYS "Hourglass_Off"
3890 PROCswap:CLS:PROCswap:CLS
3900 ang%=1
3910 :
3920 REPEAT
3930 PROCswap
3940 SYS "OS_SpriteOp",34+256,spr,STR$(ang%),-520,-360,0
3950 IF INKEY(-26) THEN ang%=((ang%+max%-2) MOD max%)+1
3960 IF INKEY(-122) THEN ang%=(ang% MOD max%)+1
3970 UNTIL FALSE
3980 ENDPROC
```

HATTRIX

Listing 1

```
10 REM >Create (Data files for HatTrix)
20 REM By Bryan Cloud
30 REM For BBC B/B+/M/C/(A)
40 REM (c) BAU Feb 1991
50 :
60 MODE 7
70 DIM block &11,name 20,mem &200
80 chs$="0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ"
90 READ line$
100 line=0
110 bits=0
120 check=0
130 FOR file=1 TO 6
140 file$=""
150 REPEAT
160 char=FNbget
170 IF char<>0 file$=file$+CHR$char
180 UNTIL char=0
190 length$=""
200 FOR char=1 TO 4
210 length$=length$+CHR$FNbget
220 NEXT
230 length=EVAL("&"+length$)
240 PRINT"Making '";file$;"'";
250 FOR poke=0 TO length-1
260 PRINTTAB(20,VPOS);length-poke-1;" ";
270 mem?poke=FNbget
280 NEXT
290 $name=file$
300 !block=name
310 block!2=0
320 block!6=0
330 block!10=mem
340 block!14=mem+length
350 X%=block MOD 256
360 Y%=block DIV 256
370 A%=0
380 CALL &FFDD
390 PRINTTAB(20,VPOS);"- Saved O.K."
400 NEXT
410 REPEAT
420 zz=FNbget
430 UNTIL line$="end"
440 END
450 :
460 DEF FNbget
470 byte=0
480 FOR bget=1 TO 8
490 IF bits=0 PROCgetchar
```

Continued ▶

HATTRIX

◀ Continued

```
  500 byte=byte DIV 2
  510 IF val AND bits byte=byte OR 128
  520 bits=bits DIV 2
  530 NEXT
  540 =byte
  550 :
  560 DEF PROCgetchar
  570 char$=LEFT$(line$,1)
  580 IF char$="/" PROCchecksum
  590 line$=MID$(line$,2)
  600 val=INSTR(chs$,char$)-1
  610 check=check+val
  620 bits=16
  630 ENDPROC
  640 :
  650 DEF PROCchecksum
  660 IF (check MOD 256)<>EVAL("&"+RIGHT
$(line$,2)) PRINT '"Checksum error at li
ne ";line*10+730:END
  670 READ line$
  680 char$=LEFT$(line$,1)
  690 line=line+1
  700 check=0
  710 ENDPROC
  720 :
  730 DATA 18R8CBGAUR7ØØ34CC8E28P1K6J/23
  740 DATA QF8J7C7GU3PV22KA9D5SIA5ALE/6E
  750 DATA K6JQØQJ5CTGEHQN5TFK1468L2K/85
  760 DATA BHE54UJVVG3GGBGL6ILØEFØ962/6Ø
  770 DATA Ø36FG8NØV1MA527402C6OK7431/F9
  780 DATA 65ØOGOQGO25R74488F9A4SVTSD/75
  790 DATA 8D6OLG45GA187H49GH3KR1SCPU/5C
  800 DATA 4GJ1I3H11KTGS696344IAØ9J3O/2Ø
  810 DATA PI288M34DØKFUPØC9HE5PNØ2C9/41
  820 DATA 53KUJQVBTØC1G6GQRAT7LUØ6GM/A3
  830 DATA 3ODHM7OV3AF937VVVVVVVVVVVV/3Ø
  840 DATA VVSBED1G18EH8Ø927C2I9398GØ/2Ø
  850 DATA 1I12OØØ49GBOØ4I8GS78062BG/1A
  860 DATA Ø54Ø7VVVVVVVVVVVVG832K8HI2/E2
  870 DATA OLØS7ICF1S7GUØHF1S6C94038U/6C
  880 DATA 3C6ØCEP1448H2E8C1833VVVVVV/57
  890 DATA VVVVVVP4IIQCPJ4SNJUØ5GGIIA/Ø8
  900 DATA 9F4ALADADBKUJQOPJEC3KEHQ72/8A
  910 DATA SNHUG5ØK248HA7OSJIF9VVGCØQ/AØ
  920 DATA ØS4BCØØ932IØSCH4IKM28Ø5M5I/ØC
  930 DATA Ø2MØG8K2JØØAHCJC21P6OØ1SNH/1E
  940 DATA PE1BØØVØPFUA1CIOKB912CKGO6/52
  950 DATA GL3K3ØOBØT145G87HA34HØA8G3/ØØ
  960 DATA ØC2ØM2PO6O6JAF1O1CS8A2HS7V/5Ø
  970 DATA KGA9956K6JQ8OJ6CLGE9ON1S88/6F
  980 DATA H144HIU85ALQGQVA34D5NM1OND/77
  990 DATA TNI1C5GR3C9957VGH5ØØAG1854/21
 1000 DATA 1CLH4Ø1OGIO224PIØØ892DØ7ØØ/E4
 1010 DATA R2I84C68MGØ3H33GJJI818I8DI/27
 1020 DATA S79VUI23ABG444SGO9HMNG22SE/7A
 1030 DATA PJ1CFHOBGH344H478RØ4AHMØOU/52
 1040 DATA 1KØGAØ8M142GQ381Ø4VVH9CJH2/18
 1050 DATA GONØØ3ØC3G6CHH68VJKEPQ7SP3/69
 1060 DATA 2CHV68OJ4FPQ7CT3UCHH68VJ4C/8C
 1070 DATA 917SP32CHVØØØØØØØØ1C5GMØG2/E2
 1080 DATA Ø8ØØØ3OF1S7GU3OØØØAHA59F5S/Ø2
 1090 DATA NGØØØØØØØ1848HØØA1248ØØØA1/71
 1100 DATA 248Ø2G8H25ØH24Ø1848HØØØ184/8A
 1110 DATA 8HØØA1248ØØØ6ØØØØ4ØØØØØØØØ/3C
 1120 DATA 1GØ1GDØG4ØS2ØØØCØØØØØØØGØG/8D
 1130 DATA 4ØG1ØØØØ2A32S8K65OØØOJØC1G/C9
 1140 DATA 1G2Ø81Ø4ØG2ØØØØØØØØØØØØØ4Ø/4E
 1150 DATA G2Ø81Ø4ØGAØC1G6ØØ3ØC1GUØØ3/CD
 1160 DATA ØC1G6ØØ31S1G2Ø81Ø4ØG2183ØØ/99
 1170 DATA ØØØØØØØØØØ2Ø6ØG2Ø81Ø4ØG3ØC/46
 1180 DATA ØG2Ø81Ø4ØG6ØØØØØØØØØØØLØØA/54
 1190 DATA GØØØØØØAHV2KL2KAHV7SVJUØØØ/38
 1200 DATA 2KVJUFPV7SØØØØØØØØAHAFOØØØ/1C
 1210 DATA ØØØØØØØØAG1G4ØG2Ø81Ø4ØØ3Ø4/6D
 1220 DATA ØG2Ø81Ø41GØØØØØØØØ1ØØØØØØ8/39
 1230 DATA 124ØK32ØØØØØOJ4C9S64ØØØØ1H/9C
 1240 DATA 68OJOC8ØØØØ124ØH2GOGØØØØØØ/B7
 1250 DATA ØØØØHØØØC1Ø4ØG2Ø81Ø6ØØ1Ø4/6Ø
 1260 DATA ØG2Ø81ØCØØØØØØØ2G2ØØØØØØG3/4E
 1270 DATA 1C1GMØØØØØ3G6ØOBØCØØØØØØØK/9Ø
 1280 DATA ØG62OØØØØØØØØØØØØ5GØØØØØØØ/45
 1290 DATA ØØ1ØØØ3Ø81Ø4ØG2Ø81G6Ø81Ø4/4F
 1300 DATA ØG2Ø83Ø2KA185ØK248ØØØØØ1A5/7D
 1310 DATA 1U68OGØAH87KU3OCHHØØØØØ58K/1B
 1320 DATA 7OP32Ø1A5ØUJOF1I64ØØØØØØØØ/C2
 1330 DATA ØØØØØØØ2Ø81Ø4ØG2ØC1G2Ø81Ø4/65
 1340 DATA ØG2ØØØØØØØØØØØØØ4ØØØØØ1Ø4Ø/33
 1350 DATA HBØCØØØØ3ØCBIMØØØØØ1G6ØON/EØ
 1360 DATA 5C1GØØØØØ44HQAO3ØØG3G9ØØØØ/A6
 1370 DATA ØØ2Ø6ØI2Ø81Ø4ØG3ØCØG2Ø81Ø4/67
 1380 DATA ØG6ØØØØØØØØØØØØØØAHA7SQPR5/B1
 1390 DATA TV7SVJU58L2KVJUFOØØØØØØØØØ/5E
 1400 DATA 7SAIKAGØØØØØØFØØØØØ1A58L2K/D7
 1410 DATA ØØ1G4ØG2Ø81Ø4ØØ3Ø4ØG2Ø81Ø4/72
 1420 DATA 1GØØØØK2GA18ØØK3OF1G7GO3OF/F2
 1430 DATA 1S7GU3K51Q2GU3OFØØØØVGØFOØ/39
 1440 DATA ØØAØØAGL58AGØØØØØØØØØØØØØØ/6Ø
 1450 DATA ØC1Ø4ØG2Ø81Ø7IGE9OH8CBGØ1I/D7
 1460 DATA 6A43ØØØØØØØØØØØØØØ1A58ØØØØ/2F
 1470 DATA ØG24FHU3OV18AIKØØ3ØS1GEØ82/ØF
 1480 DATA ØK1ØØØ81ØØØØØ812ØØØØØØØØØØ/29
 1490 DATA ØØ8124ØØØØØØØØØØØØØØØKØØØØ/23
 1500 DATA ØØØL58Ø1AAGØ2KLØ4182Ø82G4Ø/9F
 1510 DATA G5ØØØØØAØØØØØØØ4ØH2ØØØØØØØ/36
 1520 DATA ØØØØØØØØØØØØØØØØØØØØØAHAØØ/25
 1530 DATA ØØØØØ3SFGU7OAØØØØØØØØ7ØC3G/C3
 1540 DATA 2ØØØØØØ2Ø8ØØØØØØØØØØØØØØØØ/ØC
 1550 DATA ØØØØH2ØØØØØØØØØØ4ØØØØAØØØØ/21
 1560 DATA 2KL1AAGL58AIKØG5Ø82G4182ØK/F4
 1570 DATA Ø2ØØØØ5ØØØØØØØØØ8HØØØØØØØØ/2Ø
 1580 DATA ØØØØØØØØØØ12ØØL2KØØØØØ8ØØ7/3D
 1590 DATA OV1SFGK59AØØ1GEØO7Ø41ØAØGØ/FC
 1600 DATA Ø4ØGØØØØ4ØØØØØØØØØØØØØØH4Ø/2D
 1610 DATA 8HØ5ØØØØØØØØØØØØØØØØØØØØAI/3A
 1620 DATA KØØL58Ø1AAG2ØK1Ø4182ØC2GØØ/9F
 1630 DATA ØØØØØØØØØØ2ØH2ØAØØØØØØØØØØ/1F
 1640 DATA ØØØØØØØØØØØØØØØØ58LØØØØØØØ/22
 1650 DATA Ø1U7OF3S5ØØØØØØC3G61O1ØØØØ/BØ
 1660 DATA ØØ1Ø4ØØØØØØØØØØØØØØØØØØØØ8/ØD
 1670 DATA HØ2GØØØØØØ2ØØØØØØØØØØ1AAGL/5F
 1680 DATA 58AIK59AØ82G4182ØK1ØAØ1ØØØ/9E
 1690 DATA ØØØØØØØØØØØ48G5ØØØØØØØØØØØ/21
 1700 DATA ØØØØØØØØØØØØØØØØØØØØØØØØØØ/ØØ
 1710 DATA ØØØØØØØØØØØØØØØØØØØØØØØØØØ/ØØ
 1720 DATA ØØØØØØØØØØØØØØØØØØØØØØØØØØ/ØØ
 1730 DATA ØØØØØØØØØØØØØØØØØØØØØØØØØØ/ØØ
 1740 DATA ØØØØØØØØØØØØØØØØØØØØØØØØØØ/ØØ
 1750 DATA ØØØØØØØØØØØØØØØØØØ626QNAC8/5D
 1760 DATA K65OØØP32C1GØØ98Ø4ØØ6Ø1SØØ/AA
 1770 DATA 1G6ØØØØ4ØG2Ø83ØC1J8A18Ø4U1/96
 1780 DATA ØØG3ØØØG2Ø8ØØC1G6ØØ15ØKØØØ/6A
 1790 DATA O2Ø8ØØ2Ø81Ø4ØIGØ9K6GOØØ5ØK/B7
 1800 DATA 7ØØØ2Ø8ØØ4ØØ6ØØ1ØØ1G2AØØØ4/55
 1810 DATA K18ØØ1ØØØIGØ83ØCQ3GAØ12G1Ø/A2
 1820 DATA 4ØØ1Ø4ØG2ØØ3ØCØGØØO15ØØØ2A/7C
 1830 DATA 1KØØØGØØ18Ø41G6D18Ø41JØD18/8D
 1840 DATA Ø4ØØØØØ1ØØ1G6Ø8ØØ4K38ØØ3Ø8/52
 1850 DATA AØØØ81Ø4KØ2ØO36ØQ2GØ9O2G1Ø/AE
 1860 DATA 6ØØ1Ø4ØGØØ984ØØØ6Ø1SØØ1G6Ø/6A
 1870 DATA ØØØ4ØG281Ø5ØØJØFØØØCUØØØO3/8B
 1880 DATA ØØØG2Ø8ØØC1G6ØØ15ØKØØØO22Ø/73
 1890 DATA ØØ2Ø81Ø4ØIGØ9K7GØØ6FØØØC1G/97
 1900 DATA ØØ81Ø4ØØ2AØ1ØØØ3ØDØØØØS18Ø/4F
 1910 DATA Ø1ØØØG2ØØ3ØCQ2GAØ12G1Ø4ØØ1/A1
 1920 DATA Ø4ØG2ØØ3ØCØGØØ987ØØØ6ØG2ØØ/65
 1930 DATA ØG2Ø98Ø41G6D18Ø41H8518Ø4ØG/94
 1940 DATA 2ØØ1622Q34TIL65OØØO312K8ØØ/CF
 1950 DATA ØØØØØØØFHFTCT981BO7AVJVGØG/2C
 1960 DATA 1OV2MCEK2Ø72OAPQQG2IØØRU7V/7B
 1970 DATA ØØ2FPC6CT821BU5V5JLHØ5ØCL3/24
 1980 DATA M5E5ØØV2VAPQQG2JSB5B7BAØAL/5C
 1990 DATA GLOCØD85AN6N1J1LØ52OIK6CØ4/26
 2000 DATA ØGBJAGPG2G2LEDE363ØHØ5OLOC/36
 2010 DATA ØC2ØØM4L1J11Ø5AKASØØ6L2L1J/E2
 2020 DATA Ø5PL848Ø691B3AØGØ58LSØ14A5/D1
 2030 DATA ØL6LØ3ØØØG3KALGØ2L2LEHAKØØ/F4
 2040 DATA IKALC9A36ØAØALOLOCØD8ØØM4L/2B
 2050 DATA 1HI5ØHASAS6Ø6K2KB29ØPGOG2G/35
 2060 DATA 6ØØN2LØGØ5958ØØ1A1AL15Ø1G5/BE
 2070 DATA 81AKIKØ98LØLIHC8Ø28KA2AØ1Ø/F4
 2080 DATA 2L2GØØPM4CO4A4ØØØØØØØØØØØØ/92
 2090 DATA !!end
```

Listing 2

```
   10 REM >Hat0 - HatTrix
   20 REM By Bryan B. Cloud
   30 REM For BBC B/B+/M/C
   40 REM (C) BAU Feb 1990
   50 :
   60 IF PAGE<>&3000 THEN PAGE=&3000:CHA
IN "Hat0"
   80 L%=&6000
   90 MODE 7:LOMEM=L%
  110 nplat%=41
  120 nhats%=8
  130 hstsize%=8
  140 maxpower%=64
  150 peakpower%=48
  160 cluedelay%=255
  170 xjump%=20
  180 bonusevery%=4
  190 starthats%=4
  200 startmax%=8
  210 starttime%=60
  220 startextra%=30
  230 timedec%=5
  240 lowesttime%=30
  250 lowestextra%=14
  260 bonustime%=2*60*50/64
  270 bonushats%=255
  280 bonusmax%=8
  290 slowestclue%=25
  300 maxtime%=240
  310 hatscore%=5
  320 bonusscore%=20
  340 playwidth%=80
  350 topbord%=32
  360 playheight%=124+topbord%
  370 hstep%=64
  380 vstep%=32
  390 totalwidth%=playwidth%*hstep%*4
  400 totalheight%=2*playheight%*vstep%*
4
  410 screenwidth%=16
  420 screenheight%=33
  430 statusheight%=2
  440 emergency%=2
  450 normal%=5
  460 boundary%=5
  470 bytewidth%=screenwidth%*32
  480 screensize%=screenheight%*bytewidt
h%
  490 tlhc%=&3000
  500 playlines%=screenheight%-2
  510 springsx%=totalwidth%/2
  520 springsy%=totalheight%-16*vstep%
  530 screensx%=springsx%-(screenwidth%*
4/2)*hstep%
  540 screensy%=totalheight%-((playlines
%-1)*8)*vstep%
  550 lastplat%=&8000-6*8-1
  570 osrdch=&FFE0
  580 oswrch=&FFEE
  590 osword=&FFF1
  600 osbyte=&FFF4
  610 oscli=&FFF7
  630 zpaddr=0
  650 scrollcount=FNzp(1)
  660 scrolltype=FNzp(1)
  670 scrolltype2=FNzp(1)
  690 tread=FNzp(2)
  700 twrite=FNzp(2)
  710 tready=FNzp(1)
  720 twritey=FNzp(1)
  730 tbyte=FNzp(1)
  740 tcount=FNzp(1)
  750 tcol=FNzp(1)
  760 number=FNzp(2)
  770 score=FNzp(2)
  780 entry=FNzp(1)
  800 time=FNzp(1)
  810 level=FNzp(1)
  820 bonusflag=FNzp(1)
  830 soundflag=FNzp(1)
  840 yptr=FNzp(2)
  850 xptr=FNzp(2)
  860 tptr=FNzp(2)
  870 hatson=FNzp(1)
  880 hatstoput=FNzp(1)
  890 levelhats=FNzp(1)
  900 levelhmax=FNzp(1)
  910 leveltime=FNzp(1)
  920 levelxtra=FNzp(1)
  930 extratime=FNzp(1)
  950 dx=FNzp(2)
  960 dy=FNzp(2)
  980 x=FNzp(1)
  990 y=FNzp(1)
 1010 scx=FNzp(2)
 1020 scy=FNzp(2)
 1030 hcx=FNzp(2)
 1040 hcy=FNzp(2)
 1050 ohcx=FNzp(2)
 1060 ohcy=FNzp(2)
 1080 power=FNzp(1)
 1090 flexed=FNzp(1)
 1100 flexing=FNzp(1)
 1110 crouch=FNzp(1)
 1120 jumpdir=FNzp(1)
 1140 hatdir=FNzp(1)
 1150 cluedir=FNzp(1)
 1160 scandir=FNzp(1)
 1170 cluetime=FNzp(1)
 1180 newclue=FNzp(1)
 1190 clueping=FNzp(1)
 1210 ticker=FNzp(1)
 1220 counta=FNzp(1)
 1230 countb=FNzp(1)
 1240 countc=FNzp(1)
 1250 counter=FNzp(1)
 1260 tempa=FNzp(1)
 1270 tempx=FNzp(1)
 1280 tempy=FNzp(1)
 1300 bars=FNzp(1)
 1310 oldbars=FNzp(1)
 1320 oldalt=FNzp(1)
 1330 timesound=FNzp(1)
 1350 read=FNzp(2)
 1360 write=FNzp(2)
 1370 write2=FNzp(2)
 1380 scraddr=FNzp(2)
 1390 temp=FNzp(2)
 1400 vect=FNzp(2)
 1410 addr=FNzp(2)
 1420 rd=FNzp(1)
 1440 digits%=&100
 1450 code%=&1100
 1470 DIM m2(7,7)
 1480 FOR c1=0 TO 7
 1490 FOR c2=0 TO 7
 1500 m2(c1,c2)=FNm2(c1,c2)
 1510 NEXT
 1520 NEXT
 1540 PRINT"Assembling code..."
 1550 P%=code%
 1560 pass%=0
 1570 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NE
XT
 1580 ?&97E=?2:?&97F=?3
 1590 CHAIN "Hat1"
 1600 :
 1610 DEF FNzp(mem)
 1620 zpaddr=zpaddr+mem
 1630 =zpaddr-mem
 1640 :
 1650 DEF FNm2(c1,c2)
 1660 m1=2
 1670 m2=1
 1680 b=0
 1690 FOR i=0 TO 3
 1700 IF c1 AND 2^i b=b OR m1
 1710 IF c2 AND 2^i b=b OR m2
 1720 m1=m1*4
 1730 m2=m2*4
 1740 NEXT
 1750 =b
```

Listing 3

```
   10 REM >Hat1 - HatTrix
   20 REM By Bryan B. Cloud
   30 REM For BBC B/B+/M/C
   40 REM (C) BAU Feb 1990
   50 :
   60 LOMEM=L%
   70 FOR Z%=0 TO &7D:Z%?&482=Z%?&900:NE
XT
   80 ?2=?&97E:?3=?&97F
   90 :
  100 P%=code%
  110 :
  120 PRINTCHR$13;"  Listing 1, pass ";p
ass%;
  130 [OPT pass%
  140 .game
  150 LDA #22
  160 JSR oswrch
  170 LDA #2
  180 JSR oswrch
  190 LDY #6
  200 .set6845
  210 LDA vduregs,Y
  220 LDX vduregs+1,Y
  230 STA &FE00
  240 STX &FE01
  250 DEY
  260 DEY
  270 BPL set6845
  280 JSR resetscr
  290 LDX #rd MOD 256
  300 LDY #rd DIV 256
  310 LDA #3
  320 JSR osword
  330 LDA #229
  340 LDX #1
  350 JSR osbyte
  360 LDX #env1 MOD 256
  370 LDY #env1 DIV 256
  380 LDA #8
  390 JSR osword
  400 LDX #env2 MOD 256
  410 LDY #env2 DIV 256
  420 LDA #8
  430 JSR osword
  440 LDX #env3 MOD 256
  450 LDY #env3 DIV 256
  460 LDA #8
  470 JSR osword
  480 LDX #env4 MOD 256
  490 LDY #env4 DIV 256
  500 LDA #8
  510 JSR osword
  520 LDA #0
  530 STA soundflag
  540 .gameloop
  550 JSR showhst
  560 LDX #psmess MOD 256
  570 LDY #psmess DIV 256
  580 JSR writes
  590 .wfs1
  600 LDX #256-99
  610 JSR inkey
  620 BEQ wfs1
  630 .wfs2
  640 LDX #256-99
  650 JSR inkey
  660 BNE wfs2
  670 LDA #0
  680 STA level
  690 STA score
  700 STA score+1
  710 JSR calcscore
  720 LDA #starthats%
  730 STA levelhats
  740 LDA #startmax%
  750 STA levelhmax
  760 LDA #starttime%
  770 STA leveltime
  780 LDA #startextra%
  790 STA levelxtra
  800 LDA #bonusevery%
  810 STA bonusflag
  820 .levelloop
  830 LDX leveltime
  840 LDA bonusflag
  850 BNE notbontime
  860 LDX #bonustime%
  870 .notbontime
  880 STX time
  890 LDA levelxtra
  900 STA extratime
  910 LDA #0
  920 STA flexing
  930 STA flexed
  940 STA power
  950 STA scrollcount
  960 STA jumpdir
  970 STA hatson
  980 STA oldbars
  990 STA clueping
 1000 JSR calcclue
 1010 STA cluetime
 1020 LDA #8
 1030 STA timesound
```

Continued ▶

HATTRIX

◀ Continued

```
1040 LDY #7
1050 .setxy
1060 LDA basexy,Y
1070 STA scx,Y
1080 DEY
1090 BPL setxy
1100 LDA hcy+1
1110 STA oldalt
1120 JSR resetscr
1130 LDA bonusflag
1140 BNE screeninfo
1150 LDX #bonlev MOD 256
1160 LDY #bonlev DIV 256
1170 JSR writes
1180 JMP statwait
1190 .screeninfo
1200 LDX #levnum MOD 256
1210 LDY #levnum DIV 256
1220 JSR writes
1230 LDA level
1240 LSR A
1250 LSR A
1260 CLC
1270 ADC #1
1280 JSR decimala
1290 LDX #scrnum MOD 256
1300 LDY #scrnum DIV 256
1310 JSR writes
1320 LDA level
1330 AND #3
1340 CLC
1350 ADC #1
1360 JSR decimala
1370 LDX #hatnum MOD 256
1380 LDY #hatnum DIV 256
1390 JSR writes
1400 LDA levelhats
1410 JSR decimala
1420 .statwait
1430 JSR status
1440 LDA #160
1450 JSR paws
1460 LDA level
1470 AND #3
1480 STA temp
1490 ASL A
1500 ADC temp
1510 ASL A
1520 TAY
1530 LDX #0
1540 .setptrs
1550 LDA levptr,Y
1560 STA yptr,X
1570 INY
1580 INX
1590 CPX #6
1600 BNE setptrs
1610 LDY #nhats%*2-1
1620 LDA #0
1630 .clearhats
1640 STA hatlist,Y
1650 DEY
1660 BPL clearhats
1670 LDX levelhats
1680 LDY levelhmax
1690 LDA bonusflag
1700 BNE notbonhats
1710 LDX #bonushats%
1720 LDY #bonusmax%
1730 .notbonhats
1740 STX hatstoput
1750 STY counter
1760 .inithats
1770 JSR placehat
1780 DEC counter
1790 BNE inithats
1800 LDA #playlines%
1810 STA counter
1820 .initscreen1
1830 JSR scrollup
1840 DEC counter
1850 BNE initscreen1
1860 LDA #playlines%
1870 STA counter
1880 .initscreen2
1890 JSR scrolldown
1900 JSR redrawbottomedge
1910 DEC counter
1920 BNE initscreen2
1930 .mainloop
1940 LDX #0
1950 JSR keyints
1960 INC ticker
1970 LDA #255
1980 STA scrolltype2
1990 LDA hcy
2000 SEC
2010 SBC scy
2020 LDA hcy+1
2030 SBC scy+1
2040 CMP #boundary%
2050 BCS dontscrollup
2060 LDA scy+1
2070 BEQ dontscrollup
2080 LDX #2
2090 BNE ucutin
2100 .dontscrollup
2110 CMP #playlines%-boundary%
2120 BCC dontscrolldown
2130 LDA scy+1
2140 CMP #screensy% DIV 256
2150 BCS dontscrolldown
2160 LDX #3
2170 .ucutin
2180 LDY #18
2190 STX scrolltype
2200 STY scrollcount
2210 .dontscrolldown
2220 LDA hcx
2230 SEC
2240 SBC scx
2250 LDA hcx+1
2260 SBC scx+1
2270 CMP #normal%
2280 BCS dontscrollleft
2290 CMP #emergency%
2300 BCS scrolllater
2310 LDA #0
2320 STA scrolltype2
2330 BEQ noscroll
2340 .scrolllater
2350 LDA scrollcount
2360 BNE noscroll
2370 LDX #0
2380 BEQ lcutin
2390 .dontscrollleft
2400 CMP #screenwidth%-1-normal%
2410 BCC noscroll
2420 CMP #screenwidth%-1-emergency%
2430 BCC scrollrlater
2440 LDA #1
2450 STA scrolltype2
2460 BNE noscroll
2470 .scrollrlater
2480 LDA scrollcount
2490 BNE noscroll
2500 LDX #1
2510 .lcutin
2520 LDY #16
2530 .scrolled
2540 STX scrolltype
2550 STY scrollcount
2560 .noscroll
2570 JSR calcclue
2580 STA newclue
2590 LDX #3
2600 .prespos
2610 LDA hcx,X
2620 STA ohcx,X
2630 DEX
2640 BPL prespos
2650 LDA flexing
2660 CMP #2
2670 BEQ jmpinair
2680 CMP #3
2690 BNE notcrouching
2700 DEC crouch
2710 BEQ donecrouch
2720 JMP notinair
2730 :
2740 .donecrouch
2750 LDA #2
2760 STA flexing
2770 .jmpinair
2780 JMP inair
2790 :
2800 .notcrouching
2810 LDA scrollcount
2820 BNE jmpnocontrol
2830 LDA clueping
2840 BNE alreadyping
2850 INC clueping
2860 .alreadyping
2870 LDX #256-98
2880 JSR inkey
2890 BNE notz
2900 LDA #256-xjump%
2910 BNE keyheld
2920 .notz
2930 LDX #256-67
2940 JSR inkey
2950 BNE notx
2960 LDA #xjump%
2970 .keyheld
2980 STA jumpdir
2990 LDA #0
3000 STA clueping
3010 LDA #1
3020 STA flexing
3030 LDA power
3040 CMP #maxpower%
3050 BEQ maxflex
3060 INC power
3070 .maxflex
3080 LDA ticker
3090 AND #1
3100 BEQ dopowersound
3110 LDA power
3120 .dopowersound
3130 LDX #16
3140 JSR sound
3150 JMP notinair
3160 .jmpnocontrol
3170 JMP nocontrol
3180 :
3190 .notx
3200 LDA cluetime
3210 STA newclue
3220 BEQ sametime
3230 DEC newclue
3240 .sametime
3250 LDX #256-106
3260 JSR inkey
3270 BNE notpause
3280 LDX #paused MOD 256
3290 LDY #paused DIV 256
3300 JSR writes
3310 .paused1
3320 LDX #256-106
3330 JSR inkey
3340 BEQ paused1
3350 .paused2
3360 LDX #256-90
3370 JSR inkey
3380 BNE paused2
3390 BEQ nocontrol
3400 .notpause
3410 LDA hcy+1
3420 SEC
3430 SBC scy+1
3440 TAY
3450 CPY #boundary%+2
3460 BCC nodnudge
3470 LDA scy+1
3480 CMP #screensy% DIV 256
3490 BCS nodnudge
3500 LDA #3
3510 LDX #256-42
3520 JSR inkey
3530 BEQ nudgescroll
3540 .nodnudge
3550 CPY #playlines%-boundary%-2
3560 BCS nounudge
3570 LDA #2
3580 LDX #256-58
3590 JSR inkey
3600 BEQ nudgescroll
3610 .nounudge
3620 LDA hcx
3630 SEC
3640 SBC scx
3650 LDA hcx+1
3660 SBC scx+1
3670 TAY
3680 CPY #screenwidth%-2-normal%
3690 BCS nolnudge
3700 LDA #0
3710 LDX #256-26
3720 JSR inkey
3730 BEQ nudgescroll
3740 .nolnudge
3750 CPY #normal%+1
3760 BCC nocontrol
3770 LDA #1
3780 LDX #256-122
3790 JSR inkey
3800 BNE nocontrol
3810 .nudgescroll
3820 STA scrolltype
3830 LDA #1
3840 STA scrollcount
3850 .nocontrol
3860 LDA flexing
3870 BEQ jmpnotinair
3880 INC flexing
3890 LDA #0
3900 STA dy+1
3910 STA dx
3920 STA dx+1
3930 LDA power
3940 ASL A
3950 ASL A
3960 ROL dy+1
3970 STA dy
3980 LDX #dy
3990 JSR reverse
4000 LDA jumpdir
4010 STA dx
4020 BPL notneg
4030 LDA #255
4040 STA dx+1
4050 .notneg
4060 LDA #0
4070 STA power
4080 STA jumpdir
4090 .jmpnotinair
4100 JMP notinair
4110 :
4120 .inair
4130 LDA hcy+1
4140 CMP oldalt
4150 BEQ noinairsound
4160 STA oldalt
4170 LDA #160
4180 SEC
4190 SBC oldalt
4200 LDX #16
4210 JSR sound
4220 .noinairsound
4230 LDA hcy
4240 CLC
4250 ADC dy
4260 STA hcy
4270 LDA hcy+1
4280 ADC dy+1
4290 STA hcy+1
4300 BIT dy+1
4310 BMI upwego
4320 JSR lookbelow
4330 BEQ jmpo1
4340 CMP #5
4350 BCC nkh1
4360 JSR killhat
4370 .jmpo1
4380 JMP notocc1
4390 .nkh1
4400 TAX
4410 LDA #0
4420 STA hcy
4430 LSR dy+1
4440 ROR dy
4450 CPX #3
4460 BEQ dobounce
4470 LSR dy+1
4480 ROR dy
4490 CPX #1
4500 BEQ dobounce
4510 CPX #4
4520 BEQ dobounce
4530 LDX dy+1
4540 LDA dy
4550 ASL dy
4560 ROL dy+1
4570 CLC
4580 ADC dy
4590 STA dy
4600 TXA
4610 ADC dy+1
4620 STA dy+1
4630 .dobounce
4640 LDA dy+1
4650 BNE bounce
4660 LDA dy
4670 CMP #24
4680 BCS bounce
4690 .nobounce
4700 LDA #0
4710 STA flexing
4720 JMP notocc2
4730 .bounce
4740 LDA #3
4750 STA flexing
4760 STA crouch
4770 LDX #dy
4780 JSR reverse
4790 JMP notocc1
4800 .upwego
4810 JSR lookabove
4820 BEQ notocc1
4830 CMP #5
4840 BCC nkh2
4850 JSR killhat
4860 JMP notocc1
4870 .nkh2
4880 LDX #dy
4890 JSR reverse
4900 LDA dy+1
4910 CMP #2
4920 BCC notterminal
4930 LDA #2
4940 STA dy+1
4950 LDA #0
4960 STA dy
4970 .notterminal
4980 JMP inair
4990 .notocc1
5000 LDA hcx
5010 CLC
5020 ADC dx
5030 STA hcx
5040 LDA hcx+1
5050 ADC dx+1
5060 STA hcx+1
5070 BIT dx+1
5080 BMI lookleft
5090 LDA hcx
5100 CLC
5110 ADC #(6*hstep%) MOD 256
5120 LDA hcx+1
5130 ADC #(6*hstep%) DIV 256
5140 BNE llcutin
5150 .lookleft
5160 LDA hcx
5170 SEC
5180 SBC #1
5190 LDA hcx+1
5200 SBC #0
5210 .llcutin
5220 STA x
5230 LDA hcy+1
5240 STA y
5250 JSR initcheck
5260 JSR checkarea
5270 BNE lookedleft
5280 INC y
5290 JSR checkarea
5300 BNE lookedleft
5310 LDA hcy
5320 CLC
5330 ADC #(15*vstep%) MOD 256
5340 LDA hcy+1
5350 ADC #(15*vstep%) DIV 256
5360 STA y
5370 JSR checkarea
5380 BEQ notocc2
5390 .lookedleft
5400 CMP #5
5410 BCC nkh3
5420 JSR killhat
5430 JMP notocc2
5440 .nkh3
5450 LDA ohcx
5460 STA hcx
5470 LDA ohcx+1
5480 STA hcx+1
5490 LDX #dx
5500 JSR reverse
5510 ASL A
5520 ROR dx+1
5530 ROR dx
5540 .notocc2
5550 LDA dy
5560 CLC
5570 ADC #2
5580 TAX
5590 LDA dy+1
5600 ADC #0
5610 BMI notmaxfall
5620 CMP #1
5630 BCC notmaxfall
5640 LDA #1
5650 LDX #0
5660 .notmaxfall
5670 STX dy
5680 STA dy+1
5690 .notinair
5700 LDA time
5710 LSR A
5720 CMP #50
5730 BCC setflash
5740 LDA #50
5750 .setflash
5760 TAX
5770 LDA #10
5780 JSR osbyte
5790 LDA #9
5800 JSR osbyte
5810 LDA newclue
5820 STA cluetime
5830 JSR fx19
5840 LDA scrolltype2
5850 BMI onlyone1
5860 LDA #12
5870 STA countc
5880 .curescroll
5890 LDA scrolltype2
5900 JSR prescrollind
5910 JSR setscraddr
5920 LDA scrolltype2
5930 JSR preprescrollind
5940 DEC countc
5950 BNE curescroll
5960 .onlyone1
5970 LDA scrollcount
5980 BEQ notscrolling1
5990 LDA scrolltype
6000 JSR prescrollind
6010 JSR setscraddr
6020 .notscrolling1
6030 LDA flexed
6040 CMP #2
6050 BCC dontblank
6060 LDA #4
6070 LDX #ohcx
6080 JSR showhc
6090 .dontblank
6100 LDA flexing
6110 STA flexed
6120 JSR showcur
6130 LDA scrollcount
6140 BEQ notscrolling2
6150 LDA scrolltype
6160 JSR preprescrollind
6170 .notscrolling2
6180 LDA ticker
6190 AND #63
6200 BNE notimetick
6210 LDA time
6220 BEQ notimetick
6230 DEC time
6240 .notimetick
6250 JSR status
6260 LDA scrollcount
6270 BEQ notscrolling3
6280 DEC scrollcount
6290 .notscrolling3
6300 LDA #0
6310 LDX #256-82
6320 JSR inkey
6330 BEQ setsound
6340 LDA #&FF
6350 LDX #256-17
6360 JSR inkey
6370 BNE noset
6380 .setsound
6390 STA soundflag
6400 .noset
6410 LDA hatson
6420 ORA hatstoput
6430 ORA flexing
6440 ORA scrollcount
6450 BEQ gotemall
6460 LDX #256-113
6470 JSR inkey
6480 BNE notesc
6490 LDX #256-2
6500 JSR inkey
6510 BEQ gameover
```

Continued ▶

HATTRIX

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```
6520 .notesc
6530 LDA time
6540 BNE jmpmainloop
6550 LDA bonusflag
6560 BNE gameover
6570 LDA flexing
6580 ORA scrollcount
6590 BEQ gotemall
6600 .jmpmainloop
6610 JMP mainloop
6620 ]
6630 :
6640 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NE
XT
6650 ?&97E=?2:?&97F=?3
6660 CHAIN "Hat2"
```

Listing 3

```
   10 REM >Hat2 - HatTrix
   20 REM By Bryan B. Cloud
   30 REM For BBC B/B+/M/C
   40 REM (C) BAU Feb 1990
   50 :
   60 LOMEM=L%
   70 FOR Z%=0 TO &7D:Z%?&482=Z%?&900:NE
XT
   80 ?2=?&97E:?3=?&97F
   90 :
  100 PRINTCHR$13;"  Listing 2, pass ";p
ass%;
  110 [OPT pass%
  120 .gotemall
  130 LDA #48
  140 STA timesound
  150 .anybonus
  160 JSR fx19
  170 LDA time
  180 BEQ gotbonus
  190 JSR incscore
  200 DEC time
  210 JSR status
  220 JMP anybonus
  230 .gotbonus
  240 LDA #50
  250 JSR paws
  260 JSR nextlevel
  270 JMP levelloop
  280 .gameover
  290 LDX #95
  300 .copywigspr
  310 LDA sprdat,X
  320 STA sprdat+4*96,X
  330 DEX
  340 BPL copywigspr
  350 LDA #32
  360 STA countc
  370 .wiggle
  380 LDA countc
  390 AND #1
  400 CLC
  410 ADC #&12
  420 STA sounds+40
  430 LDA countc
  440 ASL A
  450 ASL A
  460 LDX #40
  470 JSR sound
  480 JSR fx19
  490 LDA #4
  500 JSR showcur
  510 LDA countc
  520 AND #3
  530 TAX
  540 .fade
  550 LDA sprdat+4*96,X
  560 LSR A
  570 STA sprdat+4*96,X
  580 INX
  590 INX
  600 INX
  610 INX
  620 CPX #96
  630 BCC fade
  640 DEC countc
  650 BNE wiggle
  660 LDX #gomess MOD 256
  670 LDY #gomess DIV 256
  680 JSR writes
  690 LDA #255
  700 JSR paws
  710 JSR cls
  720 JSR checkscore
  730 JMP gameloop
  740 :
  750 .paws
  760 STA countc
  770 .pawsloop
  780 JSR fx19
  790 DEC countc
  800 BEQ pawsed
  810 LDX #256-99
  820 JSR inkey
  830 BNE pawsloop
  840 .pawsed
  850 RTS
  860 :
  870 .fx19
  880 LDA #19
  890 JMP osbyte
  900 :
  910 .keyints
  920 LDA #178
  930 LDY #0
  940 JMP osbyte
  950 :
  960 .nextlevel
  970 INC level
  980 DEC bonusflag
  990 BPL dontreset
 1000 LDA #bonusevery%
 1010 STA bonusflag
 1020 BNE nextscreen
 1030 .dontreset
 1040 INC levelhats
 1050 DEC levelhmax
 1060 LDA level
 1070 AND #3
 1080 BNE nextscreen
 1090 LDA #8
 1100 STA levelhmax
 1110 LDA leveltime
 1120 CMP #lowesttime%
 1130 BCC nextscreen
 1140 SBC #timedec%
 1150 STA leveltime
 1160 DEC levelxtra
 1170 DEC levelxtra
 1180 .nextscreen
 1190 RTS
 1200 :
 1210 .blankbar
 1220 LDA #0
 1230 .showbar
 1240 LDY #7
 1250 .showbarloop
 1260 STA (write),Y
 1270 DEY
 1280 STA (write),Y
 1290 DEY
 1300 BPL showbarloop
 1310 TAY
 1320 JSR add8towrite
 1330 TYA
 1340 DEX
 1350 BNE showbar
 1360 RTS
 1370 :
 1380 .extrahalf
 1390 AND #&AA
 1400 .halftimebar
 1410 TAY
 1420 LDA countb
 1430 AND #1
 1440 BEQ onlyhalf
 1450 TYA
 1460 JSR showtimebar
 1470 .onlyhalf
 1480 INC countb
 1490 INC bars
 1500 RTS
 1510 :
 1520 .showend
 1530 LDA #m2(7,7)
 1540 .showtimebar
 1550 LDY #6
 1560 STA (write),Y
 1570 DEY
 1580 STA (write),Y
 1590 DEY
 1600 STA (write),Y
 1610 DEY
 1620 STA (write),Y
 1630 DEY
 1640 STA (write),Y
 1650 DEY
 1660 LDA #&3F
 1670 STA (write),Y
 1680 LDY #7
 1690 STA (write),Y
 1700 LDA #0
 1710 TAY
 1720 STA (write),Y
 1730 DEC counta
 1740 .add8towrite
 1750 LDA write
 1760 CLC
 1770 ADC #8
 1780 STA write
 1790 BCC donea8
 1800 LDA write+1
 1810 ADC #0
 1820 BPL add8b
 1830 SEC
 1840 SBC #&50
 1850 .add8b
 1860 STA write+1
 1870 .donea8
 1880 RTS
 1890 :
 1900 .status
 1910 LDY #18
 1920 JSR addtoscr
 1930 LDX #8
 1940 JSR blankbar
 1950 LDA #33
 1960 STA counta
 1970 JSR showend
 1980 LDA #0
 1990 STA countb
 2000 STA bars
 2010 LDA #1
 2020 STA tempa
 2030 LDX #0
 2040 LDA time
 2050 .statloop
 2060 SEC
 2070 SBC tempa
 2080 BCC donestat
 2090 PHA
 2100 LDA barcols%,X
 2110 JSR halftimebar
 2120 LDA countb
 2130 AND #15
 2140 STA countb
 2150 BNE notendsect
 2160 ASL tempa
 2170 INX
 2180 .notendsect
 2190 PLA
 2200 JMP statloop
 2210 .donestat
 2220 LDA barcols%,X
 2230 JSR extrahalf
 2240 .blanktime
 2250 LDA counta
 2260 BEQ showntime
 2270 LDA #m2(0,0)
 2280 JSR showtimebar
 2290 JMP blanktime
 2300 .showntime
 2310 JSR showend
 2320 LDA bars
 2330 CMP oldbars
 2340 BEQ noping
 2350 STA oldbars
 2360 LDA #255
 2370 SEC
 2380 SBC time
 2390 SBC #160
 2400 BCS okslev
 2410 LDA #0
 2420 .okslev
 2430 LDX timesound
 2440 JSR sound
 2450 .noping
 2460 LDX #7
 2470 JSR blankbar
 2480 LDX #0
 2490 .paintscore1
 2500 LDY #0
 2510 .paintscore2
 2520 LDA digits%,X
 2530 STA (write),Y
 2540 INX
 2550 INY
 2560 CPY #8
 2570 BNE paintscore2
 2580 JSR add8towrite
 2590 CPX #120
 2600 BNE paintscore1
 2610 LDX #screenheight%-2
 2620 LDA scrollcount
 2630 BNE setheight
 2640 LDA flexing
 2650 CMP #2
 2660 BCS setheight
 2670 LDY #14
 2680 JSR addtoscr
 2690 LDX #8
 2700 JSR blankbar
 2710 JSR showend
 2720 LDA #0
 2730 STA countb
 2740 LDA #m2(4,6)
 2750 STA temp
 2760 .powerloop1
 2770 LDX countb
 2780 CPX power
 2790 BEQ shownpower
 2800 CPX #peakpower%
 2810 BNE notpeak
 2820 LDA #m2(1,3)
 2830 STA temp
 2840 .notpeak
 2850 LDA temp
 2860 JSR halftimebar
 2870 JMP powerloop1
 2880 .shownpower
 2890 LDA temp
 2900 JSR extrahalf
 2910 LDA countb
 2920 AND #&FE
 2930 TAX
 2940 .blankpower
 2950 CPX #maxpower%
 2960 BEQ endpower
 2970 LDA #m2(0,0)
 2980 JSR showtimebar
 2990 INX
 3000 INX
 3010 BNE blankpower
 3020 .endpower
 3030 JSR showend
 3040 LDX #22
 3050 JSR blankbar
 3060 JSR showclue
 3070 LDX #screenheight%-1
 3080 .setheight
 3090 PHA
 3100 LDA #6
 3110 STA &FE00
 3120 STX &FE01
 3130 PLA
 3140 RTS
 3150 :
 3160 .killhat
 3170 TYA
 3180 PHA
 3190 LDA #7
 3200 LDX #24
 3210 JSR sound
 3220 LDA #80
 3230 LDX #32
 3240 JSR sound
 3250 LDX #bonusscore%
 3260 LDA bonusflag
 3270 BEQ nomoretime
 3280 LDA time
 3290 CLC
 3300 ADC extratime
 3310 BCS setmaxtime
 3320 CMP #maxtime%
 3330 BCC notmaxtime
 3340 .setmaxtime
 3350 LDA #maxtime%
 3360 .notmaxtime
 3370 STA time
 3380 LDA extratime
 3390 CMP #lowestextra%
 3400 BCC notmuch
 3410 DEC extratime
 3420 DEC extratime
 3430 .notmuch
 3440 LDX #hatscore%
 3450 .nomoretime
 3460 TXA
 3470 JSR addscore
 3480 PLA
 3490 TAY
 3500 LDA #0
 3510 STA write+1
 3520 LDA scy+1
 3530 STA temp
 3540 LDA hatlist,Y
 3550 SEC
 3560 SBC temp
 3570 TAX
 3580 LDA hatlist+1,Y
 3590 SEC
 3600 SBC scx+1
 3610 ASL A
 3620 ASL A
 3630 ASL A
 3640 ASL A
 3650 ROL write+1
 3660 ASL A
 3670 ROL write+1
 3680 STA write
 3690 TXA
 3700 ASL A
 3710 ADC write+1
 3720 TAX
 3730 LDA write
 3740 ADC scraddr
 3750 STA write
 3760 TXA
 3770 ADC scraddr+1
 3780 TAX
 3790 LDA scx
 3800 AND #192
 3810 LSR A
 3820 LSR A
 3830 LSR A
 3840 STA temp
 3850 LDA write
 3860 SEC
 3870 SBC temp
 3880 STA write
 3890 TXA
 3900 SBC #0
 3910 JSR wrap
 3920 STA write+1
 3930 LDA #7
 3940 STA counter
 3950 STY tempy
 3960 .plothat1
 3970 JSR fx19
 3980 LDY counter
 3990 LDA fadecols,Y
 4000 STA &FE21
 4010 LDY #7
 4020 LDA #0
 4030 .plothat2
 4040 STA (write),Y
 4050 DEY
 4060 BPL plothat2
 4070 JSR add8towrite
 4080 DEC counter
 4090 BPL plothat1
 4100 LDY tempy
 4110 LDA #0
 4120 STA hatlist,Y
 4130 DEC hatson
 4140 BEQ dontreplace
 4150 JSR placehat
 4160 .dontreplace
 4170 RTS
 4180 ]
 4190 :
 4200 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NE
XT
 4210 ?&97E=?2:?&97F=?3
 4220 CHAIN "Hat3"
```

Listing 4

```
   10 REM >Hat3 - HatTrix
   20 REM By Bryan B. Cloud
   30 REM For BBC B/B+/M/C
   40 REM (C) BAU Feb 1990
   50 :
   60 LOMEM=L%
   70 FOR Z%=0 TO &7D:Z%?&482=Z%?&900:NE
XT
   80 ?2=?&97E:?3=?&97F
   90 :
  100 PRINTCHR$13;"  Listing 3, pass ";p
ass%;
  110 [OPT pass%
  120 .preprescrollind
  130 ORA #4
  140 .prescrollind
  150 ASL A
  160 .scrollind
  170 TAX
  180 LDA scrolltab,X
  190 STA vect
  200 LDA scrolltab+1,X
  210 STA vect+1
  220 .indir
  230 JMP (vect)
  240 :
  250 .scrollup
  260 LDA scraddr
  270 SEC
  280 SBC #bytewidth% MOD 256
  290 STA scraddr
  300 LDA scraddr+1
  310 SBC #bytewidth% DIV 256
  320 JSR wrap
  330 STA scraddr+1
  340 DEC scy+1
  350 .donescrollup
  360 .null
  370 RTS
  380 :
  390 .scrolldown
  400 LDA scy+1
  410 CMP #screensy% DIV 256
  420 BCS donescrolldown
  430 LDA scraddr
  440 CLC
  450 ADC #bytewidth% MOD 256
  460 STA scraddr
  470 LDA scraddr+1
  480 ADC #bytewidth% DIV 256
  490 JSR wrap
  500 STA scraddr+1
  510 INC scy+1
  520 .donescrolldown
  530 RTS
  540 :
  550 .scrollleft
  560 LDA scx
  570 SEC
  580 SBC #64
  590 STA scx
  600 BCS llcs
  610 DEC scx+1
  620 .llcs
  630 LDA scraddr
  640 SEC
  650 SBC #8
  660 STA scraddr
  670 LDA scraddr+1
  680 SBC #0
  690 JSR wrap
  700 STA scraddr+1
  710 RTS
  720 :
  730 .scrollright
  740 LDA scx
  750 CLC
  760 ADC #64
  770 STA scx
  780 BCC rrcc
  790 INC scx+1
  800 .rrcc
  810 LDA scraddr
  820 CLC
  830 ADC #8
  840 STA scraddr
  850 LDA scraddr+1
  860 ADC #0
  870 JSR wrap
  880 STA scraddr+1
  890 RTS
  900 :
  910 .initcheck
  920 LDY #256-1
```

Continued ▶

HATTRIX

◀ Continued

```
930 .skipplat
940 INY
950 .getnextplat
960 LDA (yptr),Y
970 CMP y
980 BCC skipplat
990 BNE gotnextplat
1000 LDA x
1010 CMP #playwidth%
1020 BCS gotnextplat
1030 LDA (tptr),Y
1040 LSR A
1050 LSR A
1060 CLC
1070 ADC (xptr),Y
1080 CMP x
1090 BCC skipplat
1100 .gotnextplat
1110 STY tempy
1120 RTS
1130 :
1140 .checkarea
1150 LDA x
1160 CMP #playwidth%
1170 BCS isedge
1180 LDA y
1190 CMP #topbord%
1200 BCC isedge
1210 CMP #playheight%
1220 BCC maincheckarea
1230 .isedge
1240 LDA #1
1250 RTS
1260 .preisit
1270 LDY tempy
1280 JSR getnextplat
1290 .maincheckarea
1300 LDY tempy
1310 LDA (yptr),Y
1320 CMP y
1330 BCC preisit
1340 BNE notaplat
1350 LDA (xptr),Y
1360 CMP x
1370 BEQ isaplat
1380 BCS notaplat
1390 LDA (tptr),Y
1400 LSR A
1410 LSR A
1420 CLC
1430 ADC (xptr),Y
1440 CMP x
1450 BCC preisit
1460 .isaplat
1470 LDY tempy
1480 LDA (tptr),Y
1490 AND #3
1500 CLC
1510 ADC #1
1520 RTS
1530 .notaplat
1540 LDY #(nhats%-1)*2
1550 .checkhat
1560 LDA y
1570 CMP hatlist,Y
1580 BNE notthishat
1590 LDA x
1600 SEC
1610 SBC hatlist+1,Y
1620 CMP #2
1630 BCC isahat
1640 .notthishat
1650 DEY
1660 DEY
1670 BPL checkhat
1680 LDA #0
1690 RTS
1700 .isahat
1710 STA temp
1720 TYA
1730 ADC #5
1740 ADC temp
1750 RTS
1760 :
1770 .reverse
1780 LDA #0
1790 SEC
1800 SBC &00,X
1810 STA &00,X
1820 LDA #0
1830 SBC &01,X
1840 STA &01,X
1850 RTS
1860 :
1870 .lookbelow
1880 LDA hcy+1
1890 CLC
1900 ADC #2
1910 BNE lacutin
1920 .lookabove
1930 LDA hcy
1940 SEC
1950 SBC #1
1960 LDA hcy+1
1970 SBC #0
1980 .lacutin
1990 STA y
2000 LDA hcx+1
2010 STA x
2020 JSR initcheck
2030 JSR checkarea
2040 BNE lookedabove
2050 LDA hcx
2060 CLC
2070 ADC #(5*hstep%) MOD 256
2080 LDA hcx+1
2090 ADC #(5*hstep%) DIV 256
2100 STA x
2110 JSR checkarea
2120 .lookedabove
2130 RTS
2140 :
2150 .redrawbottomedge
2160 LDA scy+1
2170 CLC
2180 ADC #playlines%-1
2190 LDY #10
2200 BNE rtecutin
2210 .redrawtopedge
2220 LDA scy+1
2230 LDY #12
2240 .rtecutin
2250 STA y
2260 JSR addtoscr
2270 LDA scx+1
2280 STA x
2290 LDA scx
2300 AND #192
2310 LSR A
2320 LSR A
2330 LSR A
2340 TAX
2350 JSR initcheck
2360 LDA #screenwidth%*4
2370 STA countb
2380 .rteloop
2390 JSR checkarea
2400 TAY
2410 LDA losprite%,Y
2420 STA read
2430 STA rtedrawloop+1
2440 LDA hisprite%,Y
2450 STA read+1
2460 STA rtedrawloop+2
2470 CPX #0
2480 BNE notfast
2490 LDA countb
2500 CMP #4
2510 BCC notfast
2520 LDA write+1
2530 CMP #lastplat% DIV 256
2540 BCC okfast
2550 LDA write
2560 CMP #lastplat% MOD 256
2570 BCS notfast
2580 .okfast
2590 LDY #31
2600 .fastdrawloop
2610 LDA (read),Y
2620 STA (write),Y
2630 DEY
2640 LDA (read),Y
2650 STA (write),Y
2660 DEY
2670 LDA (read),Y
2680 STA (write),Y
2690 DEY
2700 LDA (read),Y
2710 STA (write),Y
2720 DEY
2730 BPL fastdrawloop
2740 LDY #2
2750 JSR addtowrite
2760 INC x
2770 LDA countb
2780 SEC
2790 SBC #4
2800 STA countb
2810 BNE rteloop
2820 .rte3
2830 RTS
2840 .notfast
2850 .shortcut
2860 LDY #0
2870 .rtedrawloop
2880 LDA platdat,X
2890 STA (write),Y
2900 INX
2910 INY
2920 CPY #8
2930 BNE rtedrawloop
2940 DEC countb
2950 BEQ rte3
2960 JSR add8towrite
2970 TXA
2980 AND #31
2990 TAX
3000 BNE shortcut
3010 INC x
3020 JMP rteloop
3030 :
3040 .redrawrightedge
3050 LDA scx+1
3060 CLC
3070 ADC #(screenwidth%-1)
3080 STA x
3090 LDY #6
3100 JSR addtoscr
3110 LDA scx
3120 AND #192
3130 CLC
3140 ADC #192
3150 BCC rlecutin
3160 INC x
3170 BNE rlecutin
3180 .redrawleftedge
3190 LDA scx+1
3200 STA x
3210 LDY #12
3220 JSR addtoscr
3230 LDA scx
3240 AND #192
3250 .rlecutin
3260 LSR A
3270 LSR A
3280 LSR A
3290 STA counta
3300 LDA scy+1
3310 STA y
3320 JSR initcheck
3330 LDA #playlines%
3340 STA countb
3350 .rleloop
3360 JSR checkarea
3370 TAY
3380 LDA losprite%,Y
3390 CLC
3400 ADC counta
3410 STA read
3420 LDA hisprite%,Y
3430 ADC #0
3440 STA read+1
3450 LDY #0
3460 LDA (read),Y
3470 STA (write),Y
3480 INY
3490 LDA (read),Y
3500 STA (write),Y
3510 INY
3520 LDA (read),Y
3530 STA (write),Y
3540 INY
3550 LDA (read),Y
3560 STA (write),Y
3570 INY
3580 LDA (read),Y
3590 STA (write),Y
3600 INY
3610 LDA (read),Y
3620 STA (write),Y
3630 INY
3640 LDA (read),Y
3650 STA (write),Y
3660 INY
3670 LDA (read),Y
3680 STA (write),Y
3690 INY
3700 LDY #8
3710 JSR addtowrite
3720 INC y
3730 DEC countb
3740 BNE rleloop
3750 RTS
3760 ]
3770 :
3780 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NE
XT
3790 ?&97E=?2:?&97F=?3
3800 CHAIN "Hat4"
```

Listing 5

```
10 REM >Hat4 - HatTrix
20 REM By Bryan B. Cloud
30 REM For BBC B/B+/M/C
40 REM (C) BAU Feb 1990
50 :
60 LOMEM=L%
70 FOR Z%=0 TO &7D:Z%?&482=Z%?&900:NE
XT
80 ?2=?&97E:?3=?&97F
90 :
100 PRINTCHR$13;"  Listing 4, pass ";p
ass%;
110 [OPT pass%
120 .showcur
130 LDX #hcx
140 .showhc
150 PHA
160 LDA &02,X
170 SEC
180 SBC scy
190 STA temp
200 LDA &03,X
210 SBC scy+1
220 ASL temp
230 ROL A
240 ASL temp
250 ROL A
260 ASL temp
270 ROL A
280 TAY
290 LDA &00,X
300 SEC
310 SBC scx
320 STA temp
330 LDA &01,X
340 SBC scx+1
350 ASL temp
360 ROL A
370 ASL temp
380 ROL A
390 TAX
400 PLA
410 .showsprite
420 PHA
430 LDA #0
440 STA write+1
450 TYA
460 AND #7
470 STA countb
480 EOR #7
490 STA counta
500 TXA
510 ASL A
520 ASL A
530 ROL write+1
540 ASL A
550 ROL write+1
560 ADC scraddr
570 STA write
580 LDA scraddr+1
590 ADC write+1
600 STA write+1
610 TYA
620 LSR A
630 LSR A
640 LSR A
650 ASL A
660 ADC write+1
670 JSR wrap
680 STA write+1
690 PLA
700 TAX
710 LDA losp%,X
720 SEC
730 SBC countb
740 STA read
750 LDA hisp%,X
760 SBC #0
770 STA read+1
780 LDA #2
790 STA counter
800 .rowloop
810 LDX #6
820 .columnloop
830 LDY countb
840 .loopa
850 LDA (read),Y
860 STA (write),Y
870 INY
880 CPY #8
890 BNE loopa
900 JSR add8towrite
910 LDA read
920 CLC
930 ADC #8
940 STA read
950 BCC nhr
960 INC read+1
970 .nhr
980 LDA countb
990 BEQ noloopb
1000 LDY #0
1010 LDA write
1020 CLC
1030 ADC #(bytewidth%-8) MOD 256
1040 STA write2
1050 LDA write+1
1060 ADC #(bytewidth%-8) DIV 256
1070 JSR wrap
1080 STA write2+1
1090 .loopb
1100 LDA (read),Y
1110 STA (write2),Y
1120 INY
1130 CPY countb
1140 BNE loopb
1150 .noloopb
1160 DEX
1170 BNE columnloop
1180 LDY #4
1190 JSR addtowrite
1200 DEC counter
1210 BNE rowloop
1220 RTS
1230 :
1240 .addtoscr
1250 LDA scraddr
1260 STA write
1270 LDA scraddr+1
1280 STA write+1
1290 .addtowrite
1300 LDA write
1310 CLC
1320 ADC addtable,Y
1330 STA write
1340 LDA write+1
1350 ADC addtable+1,Y
1360 BPL atow2
1370 SEC
1380 SBC #&50
1390 .atow2
1400 STA write+1
1410 RTS
1420 :
1430 .cls
1440 JSR fx19
1450 LDA #tlhc% DIV 256
1460 STA write+1
1470 LDA #0
1480 STA write
1490 TAY
1500 LDX #&50
1510 .clsloop
1520 STA (write),Y
1530 DEY
1540 BNE clsloop
1550 INC write+1
1560 DEX
1570 BNE clsloop
1580 RTS
1590 :
1600 .resetscr
1610 LDA #tlhc% MOD 256
1620 STA scraddr
1630 LDA #tlhc% DIV 256
1640 STA scraddr+1
1650 JSR cls
1660 .setscraddr
1670 LDA scraddr
1680 STA temp
1690 LDA scraddr+1
1700 CLC
1710 ADC #2
1720 BPL ss2
1730 SEC
1740 SBC #&50
1750 .ss2
1760 LSR A
1770 ROR temp
1780 LSR A
1790 ROR temp
1800 LSR A
1810 ROR temp
1820 LDX #12
1830 STX &FE00
1840 STA &FE01
1850 LDA temp
1860 INX
1870 STX &FE00
1880 STA &FE01
1890 RTS
1900 :
1910 .wrap
1920 BMI wrap1
1930 CMP #&30
1940 BCS wrap2
1950 ADC #&50
1960 RTS
1970 .wrap1
1980 SEC
1990 SBC #&50
2000 .wrap2
2010 RTS
2020 :
2030 .inkey
2040 STA tempa
2050 STY tempy
2060 LDY #255
2070 LDA #129
2080 JSR osbyte
2090 LDA tempa
2100 LDY tempy
2110 CPX #255
2120 RTS
2130 :
2140 .placehat
2150 LDA hatstoput
2160 BEQ ph2
2170 DEC hatstoput
2180 .ph1
2190 JSR rand
2200 AND #7
2210 ASL A
2220 TAX
2230 LDA hatlist,X
2240 BNE ph1
2250 .randomx
2260 JSR rand
2270 AND #127
2280 CMP #playwidth%-1
2290 BCS randomx
2300 STA x
2310 .randomy
2320 JSR rand
2330 AND #127
2340 CMP #playheight%-topbord%-3
2350 BCS randomy
2360 ADC #topbord%
2370 STA y
2380 LDA x
2390 CLC
2400 ADC #1
2410 SEC
2420 SBC scx+1
2430 CMP #screenwidth%+2
2440 BCS offside
2450 LDA scy+1
2460 STA temp
2470 LDA y
2480 SEC
2490 SBC temp
2500 CMP #screenheight%+2
2510 BCC randomy
2520 .offside
```

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HATTRIX

◀ Continued

```
2530 JSR initcheck
2540 JSR checkarea
2550 BNE randomx
2560 INC x
2570 JSR checkarea
2580 BNE randomx
2590 LDA y
2600 STA hatlist,X
2610 DEC x
2620 LDA x
2630 STA hatlist+1,X
2640 INC hatson
2650 .ph2
2660 RTS
2670 :
2680 .rand
2690 TXA
2700 PHA
2710 TYA
2720 PHA
2730 LDY #8
2740 .r1
2750 CLC
2760 LDA rd+3
2770 BPL r3
2780 LDX #3
2790 .r2
2800 LDA rd,X
2810 EOR rc,X
2820 STA rd,X
2830 DEX
2840 BPL r2
2850 SEC
2860 .r3
2870 ROL rd
2880 ROL rd+1
2890 ROL rd+2
2900 ROL rd+3
2910 DEY
2920 BPL r1
2930 PLA
2940 TAY
2950 PLA
2960 TAX
2970 LDA rd+3
2980 RTS
2990 :
3000 .showclue
3010 LDX #4
3020 LDA hatson
3030 BEQ plotclue
3040 LDA clueping
3050 BEQ plotclue
3060 LDA ticker
3070 LSR A
3080 LSR A
3090 AND #7
3100 TAY
3110 LDX cluescan,Y
3120 STX scandir
3130 LDA cluetime
3140 BEQ realclue
3150 INC clueping
3160 LDA #&FF
3170 STA cluedir
3180 BNE scanclue
3190 .realclue
3200 LDX cluedir
3210 BPL plotclue
3220 JSR findclue
3230 CPX #4
3240 BEQ scanned
3250 CPX scandir
3260 BNE scanclue
3270 .scanned
3280 STX cluedir
3290 JMP plotclue
3300 .scanclue
3310 LDA ticker
3320 LSR A
3330 BCS nocluenoise
3340 LSR A
3350 BCS nocluenoise
3360 AND #7
3370 TAY
3380 LDA clueping
3390 BEQ nocluenoise
3400 LSR A
3410 LSR A
3420 CLC
3430 ADC pingadds,Y
3440 LDX #0
3450 JSR sound
3460 .nocluenoise
3470 LDX scandir
3480 .plotclue
3490 LDY #18
3500 JSR addtoscr
3510 LDA loclue,X
3520 STA read
3530 LDA hiclue,X
3540 STA read+1
3550 LDA #0
3560 STA counta
3570 LDA #2
3580 STA countc
3590 .clue1
3600 LDX #4
3610 .clue2
3620 LDA #0
3630 STA countb
3640 .clue3
3650 LDY counta
3660 LDA (read),Y
3670 INC counta
3680 LDY countb
3690 STA (write),Y
3700 INY
3710 STA (write),Y
3720 INY
3730 STY countb
3740 CPY #8
3750 BNE clue3
3760 JSR add8towrite
3770 DEX
3780 BNE clue2
3790 LDY #20
3800 JSR addtowrite
3810 DEC countc
3820 BNE clue1
3830 RTS
3840 :
3850 .findclue
3860 LDA hcx+1
3870 STA x
3880 LDA hcy+1
3890 STA y
3900 LDA #255
3910 STA tempa
3920 LDY #(nhats%-1)*2
3930 .clueloop
3940 LDX #6
3950 LDA hatlist,Y
3960 BEQ noclue
3970 SEC
3980 SBC y
3990 BCS yispos
4000 LDX #0
4010 EOR #&FF
4020 ADC #1
4030 .yispos
4040 STA temp
4050 CMP #4
4060 BCS tolorr
4070 LDX #3
4080 .tolorr
4090 STX tempx
4100 LDX #2
4110 LDA hatlist+1,Y
4120 SEC
4130 SBC x
4140 BCS xispos
4150 LDX #0
4160 EOR #&FF
4170 ADC #1
4180 .xispos
4190 CMP #4
4200 BCS totorb
4210 LDX #1
4220 .totorb
4230 LSR A
4240 CLC
4250 ADC temp
4260 CMP tempa
4270 BCS noclue
4280 STA tempa
4290 TXA
4300 CLC
4310 ADC tempx
4320 STA hatdir
4330 .noclue
4340 DEY
4350 DEY
4360 BPL clueloop
4370 LDX hatdir
4380 RTS
4390 :
4400 .calcclue
4410 LDA #1
4420 LDX bonusflag
4430 BEQ steptime
4440 LDA time
4450 ASL A
4460 BCS peaktime
4470 ASL A
4480 BCS peaktime
4490 ADC #slowestclue%
4500 BCC steptime
4510 .peaktime
4520 LDA #255
4530 .steptime
4540 .nosound
4550 RTS
4560 :
4570 .sound
4580 STA sounds+4,X
4590 LDA soundflag
4600 BNE nosound
4610 TXA
4620 CLC
4630 ADC #sounds MOD 256
4640 TAX
4650 LDA #sounds DIV 256
4660 ADC #0
4670 TAY
4680 LDA #7
4690 JMP osword
4700 ]
4710 :
4720 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NEXT
4730 ?&97E=?2:?&97F=?3
4740 CHAIN "Hat5"
```

Listing 6

```
10 REM >Hat5 - HatTrix
20 REM By Bryan B. Cloud
30 REM For BBC B/B+/M/C
40 REM (C) BAU Feb 1990
50 :
60 LOMEM=L%
70 FOR Z%=0 TO &7D:Z%?&482=Z%?&900:NEXT
80 ?2=?&97E:?3=?&97F
90 :
100 PRINTCHR$13;"  Listing 5, pass ";pass%;
110 [OPT pass%
120 .checkscore
130 LDY #0
140 .compscore
150 LDA score+1
160 CMP hiscores+1,Y
170 BCC nextscore
180 BNE gotscore
190 LDA score
200 CMP hiscores,Y
210 BCC nextscore
220 BNE gotscore
230 .nextscore
240 INY
250 INY
260 CPY #hstsize%*2
270 BNE compscore
280 RTS
290 .gotscore
300 TYA
310 LSR A
320 STA entry
330 LDX #hstsize%*8
340 STY tempy
350 LDY #hstsize%*2
360 .movehst
370 LDA hiscores-2,Y
380 STA hiscores,Y
390 LDA hiscores-1,Y
400 STA hiscores+1,Y
410 LDA #8
420 STA counta
430 .movename
440 DEX
450 LDA hinames,X
460 STA hinames+8,X
470 DEC counta
480 BNE movename
490 DEY
500 DEY
510 CPY tempy
520 BNE movehst
530 .lastscore
540 LDA score
550 STA hiscores,Y
560 LDA score+1
570 STA hiscores+1,Y
580 LDY #8
590 LDA #32
600 .wipename
610 STA hinames,X
620 INX
630 DEY
640 BNE wipename
650 JSR showhst
660 LDX #enmess MOD 256
670 LDY #enmess DIV 256
680 JSR writes
690 LDX #10
700 LDA entry
710 ASL A
720 ADC entry
730 ADC #6
740 TAY
750 JSR vdu31
760 LDX #255
770 JSR keyints
780 LDA #21
790 LDX #0
800 JSR osbyte
810 LDA entry
820 ASL A
830 ASL A
840 ASL A
850 TAY
860 STY entry
870 LDX #0
880 .iloop
890 LDA #m2(2,6)
900 JSR curs
910 JSR readc
920 STA temp
930 LDA #m2(0,0)
940 JSR curs
950 LDA temp
960 BNE gotkey
970 JSR readc
980 BEQ iloop
990 .gotkey
1000 CMP #13
1010 BEQ return
1020 CMP #27
1030 BEQ escape
1040 CMP #127
1050 BEQ delete
1060 CMP #ASC" "
1070 BEQ gotchar
1080 CMP #ASC"A"
1090 BCC iloop
1100 CMP #(ASC"z"+1)
1110 BCS iloop
1120 CMP #(ASC"Z"+1)
1130 BCC gotchar
1140 CMP #ASC"a"
1150 BCC iloop
1160 SBC #(ASC"a"-ASC"A")
1170 .gotchar
1180 CPX #8
1190 BEQ iloop
1200 STA hinames,Y
1210 INX
1220 INY
1230 JSR writec
1240 JMP iloop
1250 .delete
1260 CPX #0
1270 BEQ iloop
1280 DEX
1290 DEY
1300 JSR vdu8
1310 LDA #ASC" "
1320 STA hinames,Y
1330 JSR putc
1340 JMP iloop
1350 .return
1360 CPX #0
1370 BEQ escape
1380 DEX
1390 DEY
1400 LDA hinames,Y
1410 CMP #ASC" "
1420 BEQ return
1430 RTS
1440 .escape
1450 LDX #0
1460 LDY entry
1470 .copyknock
1480 LDA knockoff,X
1490 STA hinames,Y
1500 INY
1510 INX
1520 CPX #8
1530 BNE copyknock
1540 RTS
1550 :
1560 .curs
1570 STY tempy
1580 LDY #7
1590 .zapcurs
1600 STA (twrite),Y
1610 DEY
1620 BPL zapcurs
1630 LDY tempy
1640 RTS
1650 :
1660 .readc
1670 STX tempx
1680 STY tempy
1690 LDA #129
1700 LDX #20
1710 LDY #0
1720 JSR osbyte
1730 TXA
1740 CPY #&FF
1750 BNE gotc
1760 LDA #0
1770 .gotc
1780 LDX tempx
1790 LDY tempy
1800 CMP #0
1810 RTS
1820 :
1830 .showhst
1840 LDX #thmess MOD 256
1850 LDY #thmess DIV 256
1860 JSR writes
1870 LDA #hstsize%-1
1880 STA counta
1890 .hstloop
1900 LDX #2
1910 LDA counta
1920 ASL A
1930 ADC counta
1940 ADC #6
1950 PHA
1960 TAY
1970 JSR vdu31
1980 LDA #6
1990 JSR vdu17
2000 LDA counta
2010 CLC
2020 ADC #49
2030 JSR writec
2040 LDA #3
2050 JSR vdu17
2060 PLA
2070 PHA
2080 TAY
2090 LDX #10
2100 JSR vdu31
2110 LDA counta
2120 ASL A
2130 ASL A
2140 ASL A
2150 TAY
2160 LDX #8
2170 .hstname
2180 LDA hinames,Y
2190 JSR writec
2200 INY
2210 DEX
2220 BNE hstname
2230 LDA counta
2240 ASL A
2250 TAY
2260 LDA lohat%,Y
2270 STA read
2280 LDA hihat%,Y
2290 STA read+1
2300 PLA
2310 PHA
2320 TAY
2330 LDX #100
2340 JSR vdu31
2350 LDY #63
2360 .ahat
2370 LDA (read),Y
2380 AND #&3F
2390 STA (twrite),Y
2400 DEY
2410 BPL ahat
2420 PLA
2430 TAY
2440 LDX #111
2450 JSR vdu31
2460 LDA #7
2470 JSR vdu17
2480 LDA counta
2490 ASL A
2500 TAY
2510 LDX hiscores,Y
2520 LDA hiscores+1,Y
2530 TAY
2540 LDA #(ASC"0" EOR 48)
2550 JSR decimal
2560 DEC counta
2570 BPL hstloop
2580 RTS
2590 :
2600 .writes
2610 STX addr
2620 STY addr+1
2630 LDY #0
2640 .wsloop
2650 LDA (addr),Y
2660 BEQ written
2670 CMP #31
2680 BEQ settab
2690 CMP #8
2700 BCC setcol
2710 JSR writec
2720 INY
2730 BNE wsloop
2740 .settab
2750 INY
2760 LDA (addr),Y
2770 TAX
2780 INY
2790 LDA (addr),Y
2800 STY temp
2810 TAY
2820 JSR vdu31
2830 LDY temp
2840 INY
2850 BNE wsloop
2860 .setcol
2870 JSR vdu17
2880 INY
2890 BNE wsloop
2900 .written
2910 RTS
2920 :
2930 .vdu17
2940 TAX
2950 LDA colours,X
2960 STA tcol
2970 RTS
2980 :
2990 .vdu31
3000 TYA
3010 ASL A
3020 TAY
3030 LDA #0
3040 STA twrite+1
3050 TXA
3060 ASL A
3070 ASL A
3080 ASL A
3090 ROL twrite+1
3100 ADC scraddr
3110 STA twrite
3120 TYA
3130 ADC twrite+1
3140 ADC scraddr+1
3150 BPL vdu31b
3160 SEC
3170 SBC #&50
3180 .vdu31b
```

Continued ▶

◀ **Continued**

```
3190 STA twrite+1
3200 RTS
3210 :
3220 .vdu8
3230 LDA twrite
3240 SEC
3250 SBC #6*4
3260 STA twrite
3270 LDA twrite+1
3280 SBC #0
3290 CMP #&30
3300 BCS vdu8b
3310 ADC #&50
3320 .vdu8b
3330 STA twrite+1
3340 RTS
3350 :
3360 .writec
3370 JSR putc
3380 .vdu9
3390 LDA twrite
3400 CLC
3410 ADC #6*4
3420 STA twrite
3430 LDA twrite+1
3440 ADC #0
3450 BPL vdu9b
3460 SEC
3470 SBC #&50
3480 .vdu9b
3490 STA twrite+1
3500 RTS
3510 :
3520 .putc
3530 STX tempx
3540 STY tempy
3550 LDX #0
3560 STX temp
3570 CMP #32
3580 BEQ cintemp
3590 CMP #ASC"A"
3600 BCC isanum
3610 SBC #7
3620 .isanum
3630 SEC
3640 SBC #47
3650 STA temp
3660 .cintemp
3670 LDA temp
3680 ASL A
3690 ADC temp
3700 ASL A
3710 ADC #charset MOD 256
3720 STA tread
3730 LDA #0
3740 ADC #charset DIV 256
3750 STA tread+1
3760 LDA #24
3770 STA tcount
3780 LDX #0
3790 STX tready
3800 STX twritey
3810 .wcloop
3820 CPX #0
3830 BNE someleft
3840 LDY tready
3850 LDA (tread),Y
3860 STA tbyte
3870 INC tready
3880 LDX #4
3890 .someleft
3900 LDA #0
3910 ASL tbyte
3920 ROL A
3930 ASL tbyte
3940 ROL A
3950 TAY
3960 LDA bitmask,Y
3970 AND tcol
3980 LDY twritey
3990 STA (twrite),Y
4000 INC twritey
4010 DEX
4020 DEC tcount
4030 BNE wcloop
4040 LDX tempx
4050 LDY tempy
4060 RTS
4070 :
4080 .decimala
4090 TAX
4100 LDY #0
4110 LDA #&FF
4120 BNE decimal
4130 :
4140 .incscore
4150 LDA #1
4160 .addscore
4170 CLC
4180 ADC score
4190 STA score
4200 BCC nhs
4210 INC score+1
4220 .nhs
4230 .calcscore
4240 LDA #digits% MOD 256
4250 STA twrite
4260 LDA #digits% DIV 256
4270 STA twrite+1
4280 LDA #6
4290 JSR vdu17
4300 LDX score
4310 LDY score+1
4320 LDA #(ASC" " EOR 48)
4330 .decimal
4340 PHP
4350 STX number
4360 STY number+1
4370 STA padchar+1
4380 LDA #5
4390 PLP
4400 BPL padout
4410 LDA #0
4420 .padout
4430 STA padit+1
4440 LDY #0
4450 .dec1
4460 LDX #16
4470 LDA #0
4480 .dec2
4490 ASL number
4500 ROL number+1
4510 ROL A
4520 CMP #10
4530 BCC dec3
4540 SBC #10
4550 INC number
4560 .dec3
4570 DEX
4580 BNE dec2
4590 PHA
4600 INY
4610 LDA number
4620 ORA number+1
4630 BNE dec1
4640 .padit
4650 CPY #5
4660 BCS donepad
4670 .padchar
4680 LDA #0
4690 PHA
4700 INY
4710 BNE padit
4720 .donepad
4730 STY number
4740 .decp
4750 PLA
4760 EOR #48
4770 JSR writec
4780 DEC number
4790 BNE decp
4800 RTS
4810 ]
4820 :
4830 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NE
XT
4840 ?&97E=?2:?&97F=?3
4850 CHAIN "Hat6"
```

Listing 7

```
10 REM >Hat6 - HatTrix
20 REM By Bryan B. Cloud
30 REM For BBC B/B+/M/C
40 REM (C) BAU Feb 1990
50 :
60 LOMEM=L%
70 FOR Z%=0 TO &7D:Z%?&482=Z%?&900:NE
XT
80 ?2=?&97E:?3=?&97F
90 :
100 PRINTCHR$13;" Listing 6, pass ";p
ass%;
110 [OPT pass%
120 :
130 .thmess
140 EQUB 31:EQUB 15:EQUB 2
150 EQUB 5
160 EQUS "TOP HATTERS"
170 EQUB 0
180 :
190 .psmess
200 EQUB 31:EQUB 2:EQUB 31
210 EQUB 2:EQUS "PRESS "
220 EQUB 1:EQUS "SPACE "
230 EQUB 2:EQUS "TO START"
240 EQUB 0
250 :
260 .enmess
270 EQUB 31:EQUB 9:EQUB 31
280 EQUB 2
290 EQUS "ENTER YOUR NAME"
300 EQUB 1 \ enter colour
310 EQUB 0
320 :
330 .gomess
340 EQUB 31:EQUB 15:EQUB 14
350 EQUS STRING$(11," ")
360 EQUB 31:EQUB 15:EQUB 16
370 EQUS STRING$(11," ")
380 EQUB 31:EQUB 15:EQUB 15
390 EQUB 1
400 EQUS " GAME OVER "
410 EQUB 0
420 :
430 .levnum
440 EQUB 31:EQUB 21:EQUB 12
450 EQUB 7
460 EQUS "LEVEL "
470 EQUB 1
480 EQUB 0
490 :
500 .scrnum
510 EQUB 31:EQUB 18:EQUB 15
520 EQUB 7
530 EQUS "SCREEN "
540 EQUB 2
550 EQUB 0
560 :
570 .hatnum
580 EQUB 31:EQUB 24:EQUB 18
590 EQUB 7
600 EQUS "HATS "
610 EQUB 3
620 EQUB 0
630 :
640 .bonlev
650 EQUB 31:EQUB 18:EQUB 12
660 EQUB 2:EQUS "B O N U S"
670 EQUB 31:EQUB 18:EQUB 15
680 EQUB 3:EQUS "L E V E L"
690 EQUB 0
700 :
710 .paused
720 EQUB 31:EQUB 46:EQUB 32
730 EQUB 2:EQUS "PAUSED"
740 EQUB 0
750 :
760 .hinames
770 EQUS "SAMANTHA"
780 EQUS "OTTO    "
790 EQUS "MICHAEL "
800 EQUS "BENJAMIN"
810 EQUS "RICHARD "
820 EQUS "EDWARD  "
830 EQUS "ROSEMARY"
840 EQUS "ORLANDO "
850 .knockoff
860 EQUS "12345678"
870 :
880 .hiscores
890 EQUW 321
900 EQUW 285
910 EQUW 254
920 EQUW 202
930 EQUW 129
940 EQUW 96
950 EQUW 43
960 EQUW 10
970 EQUW 0
980 :
990 .vduregs
1000 EQUB 1:EQUB screenwidth%*4
1010 EQUB 2:EQUB 98-screenwidth%/2
1020 EQUB 6:EQUB screenheight%
1030 EQUB 10:EQUB 255
1040 :
1050 .basexy
1060 EQUW screensx%
1070 EQUW screensy%
1080 EQUW springsx%
1090 EQUW springsy%
1100 :
1110 .scrolltab
1120 EQUW scrollleft
1130 EQUW scrollright
1140 EQUW scrollup
1150 EQUW scrolldown
1160 EQUW redrawleftedge
1170 EQUW redrawrightedge
1180 EQUW redrawtopedge
1190 EQUW redrawbottomedge
1200 :
1210 .addtable
1220 EQUW 8
1230 EQUW 32
1240 EQUW bytewidth%-48
1250 EQUW bytewidth%-8
1260 EQUW bytewidth%
1270 EQUW ((playlines%-1)*bytewidth%)
1280 EQUW 0
1290 EQUW (screenheight%-1)*bytewidth%
1300 EQUW (10/2)*8
1310 EQUW (screenheight%-statusheight%)
*bytewidth%
1320 EQUW bytewidth%-4*8
1330 :
1340 .rc
1350 EQUD &768553
1360 :
1370 .fadecols
1380 EQUB 7:EQUB 3:EQUB 6:EQUB 2
1390 EQUB 5:EQUB 1:EQUB 4:EQUB 0
1400 :
1410 .cluescan
1420 EQUB 0:EQUB 1:EQUB 2:EQUB 5
1430 EQUB 8:EQUB 7:EQUB 6:EQUB 3
1440 :
1450 .pingadds
1460 EQUB 140:EQUB 142:EQUB 144:EQUB 14
6
1470 EQUB 148:EQUB 146:EQUB 144:EQUB 14
2
1480 :
1490 .bitmask
1500 EQUB &00:EQUB &55:EQUB &AA:EQUB &F
F
1510 .colours
1520 EQUB &00:EQUB &03:EQUB &0C:EQUB &0
F
1530 EQUB &30:EQUB &33:EQUB &3C:EQUB &3
F
1540 :
1550 .barcols%
1560 EQUB m2(1,1)
1570 EQUB m2(1,5)
1580 EQUB m2(2,6)
1590 EQUB m2(3,7)
1600 :
1610 .losprite%
1620 EQUB (sprdat+4*96) MOD 256
1630 EQUB (platdat+0*32) MOD 256
1640 EQUB (platdat+1*32) MOD 256
1650 EQUB (platdat+2*32) MOD 256
1660 EQUB (platdat+3*32) MOD 256
1670 .lohat%
1680 EQUD 0:EQUD 0:EQUD 0:EQUD 0
1690 .hisprite%
1700 EQUB (sprdat+4*96) DIV 256
1710 EQUB (platdat+0*32) DIV 256
1720 EQUB (platdat+1*32) DIV 256
1730 EQUB (platdat+2*32) DIV 256
1740 EQUB (platdat+3*32) DIV 256
1750 .hihat%
1760 EQUD 0:EQUD 0:EQUD 0:EQUD 0
1780 .losp%
1790 EQUB (sprdat+0*96) MOD 256
1800 EQUB (sprdat+1*96) MOD 256
1810 EQUB (sprdat+2*96) MOD 256
1820 EQUB (sprdat+3*96) MOD 256
1830 EQUB (sprdat+4*96) MOD 256
1840 .hisp%
1850 EQUB (sprdat+0*96) DIV 256
1860 EQUB (sprdat+1*96) DIV 256
1870 EQUB (sprdat+2*96) DIV 256
1880 EQUB (sprdat+3*96) DIV 256
1890 EQUB (sprdat+4*96) DIV 256
1910 .loclue
1920 EQUD 0:EQUD 0:EQUB 0
1930 .hiclue
1940 EQUD 0:EQUD 0:EQUB 0
1950 :
1960 .env1
1970 EQUB 1:EQUB 2
1980 EQUB 0:EQUB 14:EQUB 0
1990 EQUB 7:EQUB 10:EQUB 0
2000 EQUB 0:EQUB 0:EQUB 0:EQUB 0
2010 EQUB 0:EQUB 0
2020 :
2030 .env2
2040 EQUB 2:EQUB 2
2050 EQUB 0:EQUB 0:EQUB 0
2060 EQUB 0:EQUB 0:EQUB 0
2070 EQUB 10:EQUB 40:EQUB 40:EQUB 10
2080 EQUB 100:EQUB 0
2090 :
2100 .env3
2110 EQUB 3:EQUB 2
2120 EQUB 1:EQUB 1:EQUB 0
2130 EQUB 1:EQUB -1:EQUB 0
2140 EQUB 70:EQUB -90:EQUB -20:EQUB -40
2150 EQUB 70:EQUB 0
2160 :
2170 .env4
2180 EQUB 4:EQUB 1
2190 EQUB -1:EQUB -1:EQUB -1
2200 EQUB 1:EQUB 1:EQUB 1
2210 EQUB 100:EQUB -1:EQUB -2:EQUB -3
2220 EQUB 90:EQUB 80
2230 :
2240 .sounds
2250 \ clue
2260 EQUW &11:EQUW -6:EQUW 0:EQUW 1
2270 \ tick
2280 EQUW &13:EQUW 2:EQUW 0:EQUW 10
2290 \ crouch & fly
2300 EQUW &12:EQUW 3:EQUW 0:EQUW 2
2310 \ collect
2320 EQUW &10:EQUW -13:EQUW 0:EQUW 7
2330 EQUW &11:EQUW 1:EQUW 0:EQUW 7
2340 \ fade
2350 EQUW &12:EQUW 2:EQUW 0:EQUW 10
2360 \ bonus
2370 EQUW &13:EQUW 4:EQUW 0:EQUW 1
2380 ]
2390 *SAVE TEMP 1100 +100
2400 levptr=FNalloc(24)
2410 platlist=FNimport("PlatPos")
2420 hatlist=FNalloc(nhats%*2)
2430 platdat=FNimport("GirDat")
2440 hatdat=FNimport("HatDat")
2450 sprdat=FNimport("SprDat")
2460 cluedat=FNimport("ClueDat")
2470 charset=FNimport("CharSet")
2480 *LOAD TEMP 1100
2490 :
2500 FOR Z%=0 TO &7D:Z%?&900=Z%?&482:NE
XT
2510 ?&97E=?2:?&97F=?3
2520 :
```

Continued ▶

HAT TRIX

◀ **Continued**

```
2530 pass%=pass%+2
2540 IF pass%=2 CHAIN "Hat1"
2550 :
2560 FOR i%=0 TO 11
2570  a%=platlist+i%*(nplat%+1)
2580  ?(levptr+i%*2)=a% MOD 256
2590  ?(levptr+i%*2+1)=a% DIV 256
2600 NEXT
2610 FOR i%=0 TO nhats%*2-1
2620  lohat%?i%=(hatdat+i%*32) MOD 256
2630  hihat%?i%=(hatdat+i%*32) DIV 256
2640 NEXT
2650 FOR i%=0 TO 8
2660  a%=cluedat+i%*32
2670  loclue?i%=a% MOD 256
2680  hiclue?i%=a% DIV 256
2690 NEXT
2700 PROCchecks
2710 PRINTCHR$11;"All checksums O.K."
2720 PRINT'"Bytes used=";P%-code%
2730 PRINT"Bytes free=";&3000-P%
2740 OSCLI"SAVE HatTrix "+STR$~code%+"
"+STR$~P%+" "+STR$~game
2750 END
2760 :
2770 DEF FNalloc(mem)
2780 P%=P%+mem
2790 =P%-mem
2800 :
2810 DEF FNimport(file$)
2820 in%=OPENIN(file$)
2830 at%=FNalloc(EXT#in%)
2840 CLOSE #in%
2850 IF pass%=2 OSCLI"Load "+file$+" "+
STR$~at%:PRINT'"Importing ";file$;
2860 =at%
2870 :
2880 DEF PROCchecks
2890 listing=0
2900 from=code%
2910 from$="game"
2920 PRINT''
2930 end=TRUE
2940 REPEAT
2950 IF end listing=listing+1:PRINTCHR$
13;CHR$11;"Checking listing ";listing
2960 READ to$
2970 PRINTCHR$13;SPC39;CHR$13;
2980 IF to$="DONE" ENDPROC
2990 IF to$="END" end=TRUE:READ to$ ELS
E end=FALSE
3000 READ sum
3010 count=0
3020 to=EVAL(to$)
3030 PRINT"  '";from$;"' to ";
3040 IF end PRINT"end"; ELSE PRINT"'";t
o$;"'";
3050 REPEAT
3060 count=count+?from
3070 from=from+1
3080 UNTIL from=to
3090 from$=to$
3100 IF count=sum PRINT" OK"; ELSE PRIN
T'"  - Checksum error!":END
3110 UNTIL 0
3120 ENDPROC
3130 :
3140 DATA gameloop,10826
3150 DATA setxy,9232
3160 DATA setptrs,7480
3170 DATA mainloop,8268
3180 DATA lcutin,10093
3190 DATA keyheld,8058
3200 DATA nodnudge,11105
3210 DATA inair,9991
3220 DATA dobounce,8221
3230 DATA notocc1,5899
3240 DATA notocc2,9166
3250 DATA notscrolling1,7948
3260 DATA END,gotemall,10798
3270 :
3280 DATA fade,6489
3290 DATA nextlevel,8641
3300 DATA showend,8404
3310 DATA statloop,8156
3320 DATA paintscore1,7714
3330 DATA endpower,10829
3340 DATA nomoretime,6960
3350 DATA plothat1,8161
3360 DATA END,preprescrollind,4468
3370 :
3380 DATA scrollleft,6093
3390 DATA getnextplat,6049
3400 DATA isaplat,8955
3410 DATA lacutin,7130
3420 DATA okfast,10783
3430 DATA redrawrightedge,8863
3440 DATA END,showcur,13792
3450 :
3460 DATA showsprite,3731
3470 DATA nhr,8692
3480 DATA resetscr,11519
3490 DATA inkey,6554
3500 DATA offside,9796
3510 DATA showclue,7853
3520 DATA plotclue,8608
3530 DATA clueloop,8734
3540 DATA calcclue,7381
3550 DATA END,checkscore,4667
3560 :
3570 DATA movename,5747
3580 DATA gotkey,10923
3590 DATA curs,12419
3600 DATA hstloop,5507
3610 DATA ahat,7447
3620 DATA vdu31,11074
3630 DATA putc,5701
3640 DATA decimala,8688
3650 DATA dec3,6029
3660 DATA END,thmess,4168
3670 :
3680 DATA scrnum,5560
3690 DATA vduregs,8319
3700 DATA colours,4933
3710 DATA env1,6699
3720 DATA END,levptr,4241
3730 :
3740 DATA DONE
```

FOTO FILER

Listing 1

```
1105 printeron=TRUE
1125 IF printeron=FALSE VDU 14
1140 P%=TRUE: E%=FALSE
1170 IF suitable PRINT TAB(E%)" ";title
$;" ";holder%;" / ";picture%;:E%=E% EOR
40
1205 VDU 15
```

Listing 2

```
1641 PROCp(20,12," Do you wish to chang
e drive? (Y/N) ",1)
1642 IF FNyes PROCp(20,12," Which drive
 do you wish to use? (0/1) ",1):REPEAT:A
$=GET$:PRINT TAB(60,12)A$;:UNTIL A$="0"
OR A$="1": OSCLI("DRIVE "+A$)
1643 PROCp(15,12,wipe$,0)
```

Listing 3

```
521 CLS: PROCp(15,12,"Do you want auto
matic picture number update?(Y/N)",1):au
to=FNyes
522 holder%=1:picture%=0
530 REPEAT
540 CLS
550 PROCp(21,1," Adding a record to th
e file: "+$S%+(LEFT$("       ",7-LEN($S%
))),1)
551 IF auto: picture%= picture% +1:PRO
Cp(1,3," Holder? ",1):PROCp(18,3,"Pictur
e no.? ",1):PROCp(40,3," Title?",1):PRIN
T TAB(11,3)holder%:PRINT TAB(33,3)pictur
e%:PROCp(49,3,".......................",
0):GOTO 640
560 PROCp(1,3," Holder? ",1):PROCp(18,
3," (-1 TO EXIT) ",1)
570 INPUT TAB(11,3)holder%
580 IF holder%<0 GOTO 710
590 PROCp(18,3," Picture no.? ",1)
600 INPUT TAB(33,3)picture%
610 PROCp(40,3," Title? ",1)
620 PROCp(49,3,"......................
.",0):REM (thats 23 dots)
630 INPUT LINE TAB(49,3)title$
640 PROCclear
650 PROCinstruct
660 PROCalter(-1)
670 PROCp(26,20,wipe$,0)
680 PROCp(26,20,"Save to disc?",0)
690 IF FNyes PROCsave(-1):ELSE picture
%=picture%-1
700 :
710 UNTIL holder%<0
720 ENDPROC
1271 file=OPENUP($S%)
```

Listing 4

```
1272 max%=(EXT#file/48)-1
1273 CLOSE#file
1330 PROCp(20,20," L/R CURSORS = BACKWA
RD/FORWARD. Q = QUIT ",1)
1331 PROCp(20,21," U/D CURSORS = BACKWA
RD/FORWARD (by 10's) ",1)
1361 IF I=138 P%=P%+10:IF P%> max% P%=m
ax%
1371 IF I=139 AND P%>9 THEN P%=P%-10
```

Listing 5

```
1490 PROCp(25,12,$S%+" : ",1)
1500 PROCi:PRINT"Are you sure? (Y/N)";
1510 UNTIL FNyes
1511 file=OPENUP($S%):CLOSE#0:REPEAT:UN
TIL INKEY$(1)=""
1512 IF file PROCp(23,12," FILE EXISTS!
! OVERWRITE? (Y/N) ",1):IF FNyes =0 GOTO
 1530
1520 file=OPENOUT($S%):CLOSE#0
1530 PROCn
```

NOTES

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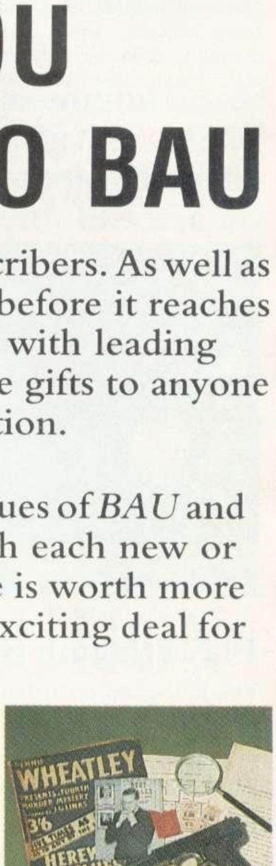


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BBC Micro/Master

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A spectacular 3D golf simulation that will keep you up to par.
5.25in disc (RRP £15.95)
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The Small Print

Please note: Due to the popularity of our subscription offers we have had to adopt the following rules:
1. No more than one free gift will be allowed per subscriber per year (unless you renew your subscription early. In which case your free gift will be supplied within 28 days). This means that we will no longer allow people to cancel their subscriptions and then re-subscribe to get another free gift.
2. This offer replaces all previous subscription offers as stocks of free gifts from previous offers are no longer available.
3. Please remember that your free gift will be despatched separately from the first issue of the magazine to which you subscribed or renewed.

Monthly disc offer

For readers who wish to receive the *BAU* monthly disc, which is packed with great programs listed in each month's issue, we also have a great offer. For as little as £5, you can receive a monthly disc with each issue – see order form.

GAMES

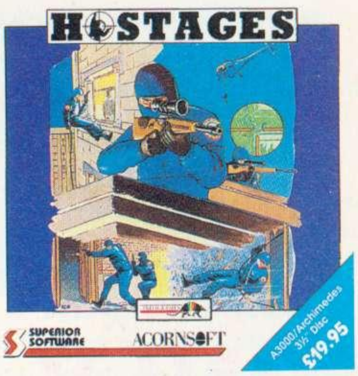


Sim City

In Sim City, you control the greatest cities of the world. In fact, you create them. Build houses, streets, industrial and commercial sites. Decide whether coal or nuclear power will be most profitable (and environment friendly!). You will need your wits about you for this unique game. Each decision you make will immediately affect your city and a wrong decision could result in crime (don't forget to build your police department) or pollution. You will face crises like tornadoes, earthquakes, etc, while trying to collect taxes and balancing the budget, but keep at it and you may become the first town planner to build the perfect city.

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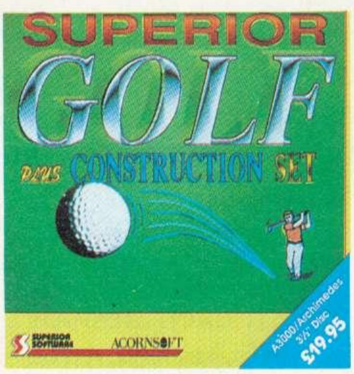
Hostages



You are the head of the Terrorist Combat Squad. An urgent call comes from the Minister for National Security. An embassy has been overrun by terrorists, and you've been put in charge of all operations. Your first priority is to place all your crack hitmen in strategic positions throughout the neighbourhood, without getting themselves shot. You then have to get your team of specialist paratroopers into the embassy and save the hostages without any loss of life. There are many potential death traps to trick you — these terrorists are no pushover! The pressure is on . . . and it's your move.

A3000/Archimedes

RRP	£19.95	Special offer	£17.95
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Superior Golf

This is the complete golfing game for one to four players, plus there are full-feature hole and course construction facilities. This realistic golf simulation is for any level of player – novice to professional. You can also play on your choice of six of the most famous courses in the world. You will soon work out how to avoid the usual golfing hazards – water, bunkers, light and heavy rough, trees and the slope of the green.

When you've mastered the sport of golf, you can design and construct your own holes and courses with the easy-to-use, but very powerful, Hole Editor and Course Editor. Then you can enjoy playing a round on your very own masterpiece.

A3000/Archimedes

RRP	£19.95	Special offer	£17.95	Saving	£2

Play it again Sam 13



This four-game compilation from Superior has yet another collection of excellent games to get the year off to a cracking start. Barbarian 2 is a game of skill and strategy and your objective is to overcome the gruesome monsters. For classic fans, there's an exciting 'bat n' ball' clone – Hyperball. Of course, everyone loves Percy Penguin, a classic and highly addictive game. Percy must kill the Snobees by hurling ice cubes at them. And Pandemonium breaks out when you try to construct the core against all odds. Intrigued? This compilation is a must for your collection.

BBC B/Master (5.25in)		BBC B/Master (3.5in)		Electron cassette	
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Special offer	£10.95	Special offer	£13.95	Special offer	£8.95
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Play it again Sam 14

Another in this series of games anthologies, this is the very latest from Superior. You've seen the movie . . . now play the game! Play your part as Schwarzenegger the Predator, fighting through the South American jungle. But, beware the lurking alien. Ballistix is a different kind of ball game. And you don't have to play alone. Have the neighbours around for a league competition, and see whose yard the ball finally falls in. And speaking of balls, Superior Soccer is pitched in to this best yet PIAS. Star Port completes the ensemble. It's a brand new arcade adventure that will transport you into space to save the station's medical supplies.

To become a hero though, you need to first look at page 108, and order your copy of Play it again Sam 14.

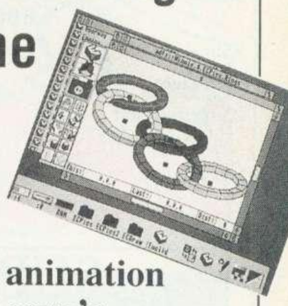
BBC B/Master (5.25in)		BBC B/Master (3.5in)		Electron cassette	
RRP	£11.95	RRP	£14.95	RRP	£9.95
Special offer	£10.95	Special offer	£13.95	Special offer	£8.95
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HURRY – OFFER VALID ONLY WHILE STOCKS LAST

DESIGN

BAU is pleased to offer its readers a great multi-tasking 3D graphics and animation system for the A3000/Archimedes

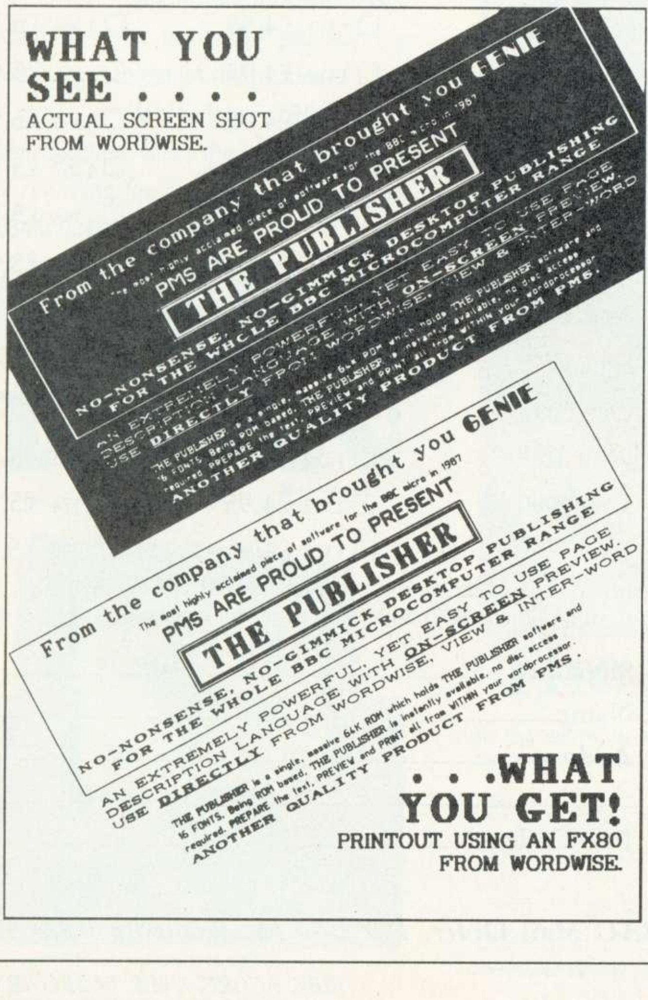




Euclid 2 from Ace Computing is the only multi-tasking 3D graphics and animation system for the Archimedes/A3000. Completely re-written to follow Acorn's guidelines for Risc OS applications, *Euclid 2* is a fully interactive, multi-document, 3D, graphics and animation system.

Designed to be simple for the beginner to get to grips with, it has an intuitive icon-driven single-window interface. You can quickly throw new ideas together, rotate them in real time, zoom in and out, view them in perspective from any position and even show the effects of lights placed anywhere in the scene. *!Draw* files can be exported and imported.

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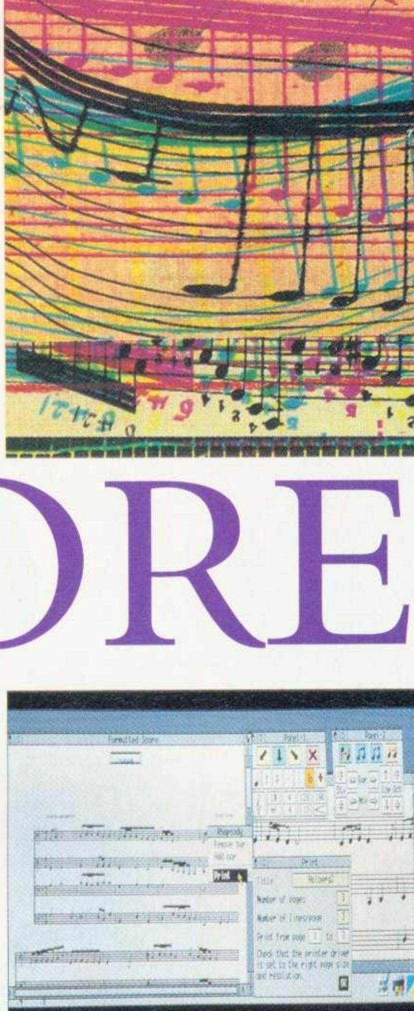
ALAN WADE knocks out a few chords on Rhapsody, the latest in Arc music power

FINAL SCORE

I'm sure all Archimedes and A3000 owners have played with *Maestro*, the free music program which is on the Applications disc. They've probably all found *Maestro* is fun, but limited.

Rhapsody is similar to *Maestro* in many ways but it has more features and is much more powerful. For example, it allows you to print the music you create and it has more sophisticated Midi facilities, although it can still use the Arc's internal sounds. It's also nice to see a new music program for the Archimedes which *isn't* a sampler.

Rhapsody and *Maestro* both use traditional music notation, which will immediately put anyone who doesn't read music at a disadvantage. However, although a music score may look like it's been produced by a spider which has crawled out of an ink bottle and over the page, music notation is not as difficult to understand as you may think. There are several excellent books which can help. I can particularly recommend *How To Read Music* by Helen Cooper in the *Basic Guide To...* series, published by Omnibus Press. Once you understand the basics you'll be able to enter your favourite tunes from sheet music.



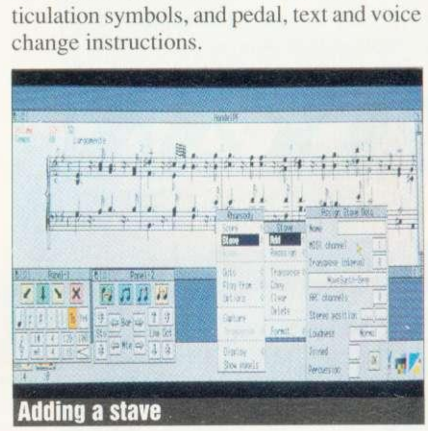
Formatted score

A score in *Rhapsody* can have up to 24 staves (*Maestro* only allows four staves plus a percussion stave), each of which can support two independent parts. Five scores can be open at once. Normally, you will only want to work on one score at a time but this allows you to transfer data from one score to another.

To begin, open a score (initially, double click on *Rhapsody* on the icon bar) and up pops an empty score window containing the beginning of a single stave. Staves expand to fit the number of notes you place on them. Music symbols are placed on the stave at the cursor position. The cursor indicates not only a horizontal position (the time axis) on a stave but also a vertical position which, in the case of notes, indicates pitch. The cursor can be moved with the mouse, but as there are only a few pixels between notes of adjacent pitch this can be tricky.

A click on the middle (menu) mouse button produces *Rhapsody*'s main menu and you need to select Display Panels from this before you can start work. Panel 1 contains notes and music symbols and panel 2 contains icons which move the cursor in line, bar, note, stave and octave increments. Line movement is by far the most useful as it is the most difficult to do accurately with the mouse.

Notes and symbols are selected from panel 1 and can be placed before, on or after the cursor. The choice of symbol is made using seven icons which hold notes, rests, accidentals, duration extenders (dots and ties, etc), bar lines, ornaments and articulation symbols, and pedal, text and voice change instructions.



Adding a stave



On the face of it this seems like a good idea: select the symbol type, click on the icon until the required symbol appears then click on one of the insert icons. In practice, it takes a lot of clicks. To delete an item it must be on cursor and the same symbol icon must be highlighted. *Maestro*'s method of clicking and dragging notes around the stave is much quicker and easier.

Other icons in Panel 1 let you select the key and time signatures, dynamic markings, tempo and give you a choice of five clefs. You can create tempo and dynamic changes, too, which is excellent. There are many eait functions available including copy, clear, delete and transpose.

Music can be entered from a Midi keyboard although the program's response is very sluggish and it often doesn't pick up everything you play, especially if you play quickly. There are Slow and Very Slow play options which can help with Midi recording.
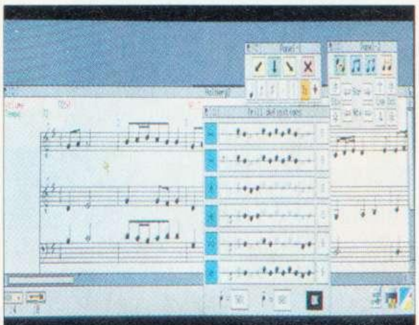
One problem which both *Maestro* and *Rhapsody* have is that they make no attempt to align the notes vertically across the staves (although recording via Midi does). This means that it's quite easy to place four eighth notes on one stave in the same space as a quarter note on another. Consequently the piece won't play correctly. Neither does either program insert bar lines automatically – surely this can't be too difficult to program, can it?

Before you begin, it's a good idea to set up the staves you need although you can add staves and alter their parameters as you go. Staves can be named and assigned an Arc voice, stereo position and number of channels. As only eight channels are available, if the piece contains many chords you'll have to work out the channel allocation carefully. This is less of a problem during playback via Midi (unless you only have an eight-voice expander!). Arc sounds and Midi channels can be changed anywhere in the score although there is no facility for Midi program changes.

Rhapsody has several interesting and innovative features. A Trill Definition window lets you define six 'ornaments' which will be interpreted across Midi, too. This will be of special interest to anyone wanting to program classical music although the definitions cannot produce every type of ornament you may require.

Text, including lyrics, can be entered anywhere in the score. An Auto Spacing option allows text to spill over into the next time slot – although an option to step automatically from one note to the next and space would have been preferable.

One thing *Rhapsody* can do which *Maestro* can't is print out the score. The printer drivers on the Archimedes Applications disc are used. You can choose portrait or landscape layout and select one of seven printout sizes. Printing ties up the computer and takes a considerable length of time, but the results are very good.



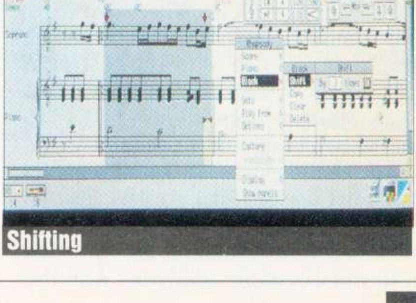
Defining 'ornaments'

Files can be saved in Midi file format for loading into other programs which support the format (not much else does at the moment). *Rhapsody* can also load *Maestro* files offering a tempting upgrade to *Maestro* users. It's interesting to note that *Rhapsody* was developed using Silicon Vision's RiscBASIC compiler.

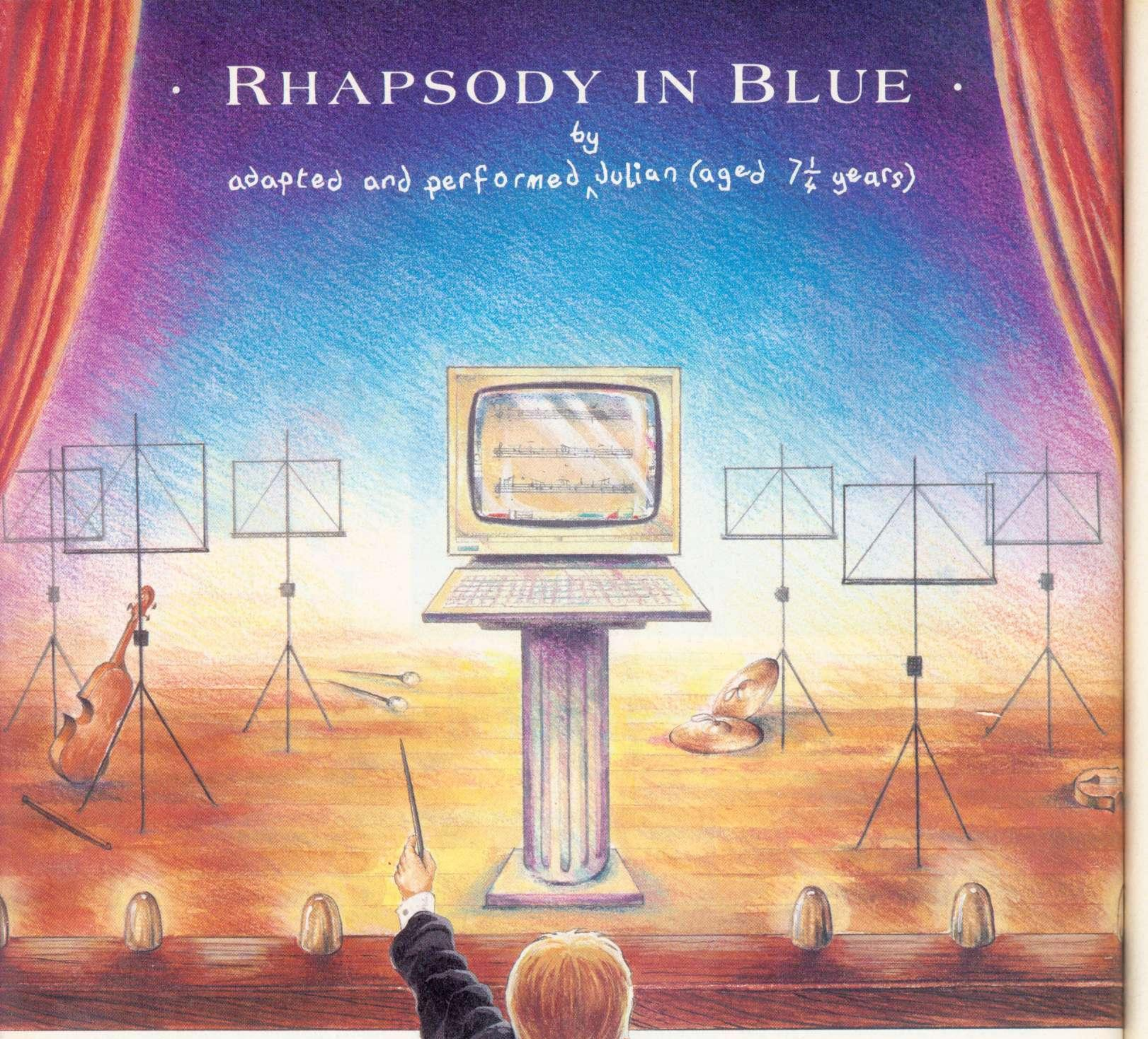
Rhapsody sets its sights on users with a wide spectrum of musical abilities, from the novice to the professional composer. While dabblers will probably take to it quite happily, the more experienced musician could well be deterred by the rather involved method of operation and lack of computerised assistance such as automatic vertical alignment across the staves.

Rhapsody offers many advantages over *Maestro* and should be considered as an upgrade, as well as a tempting purchase for anyone wishing to explore the music potential of the Archimedes without committing to MIDI equipment.

Rhapsody *costs £49.95 and is available from Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire, CW9 7DA. Tel: 0606 48511.*



Shifting



Gershwin, Mozart, Vivaldi, all scribbling away, frantically composing their masterpieces, oh, to have had something a little more practical than pen and ink.

Imagine their delight had they seen Rhapsody. A new music notation package from Clares that allows you to write and modify musical scores in much the same way as a word processor allows you to manipulate text.

You can enter the music manually note by note. Or simply play the music in using a MIDI interface and a MIDI keyboard. Using a standard RISC OS printer Driver, pages, whole scores or individual parts can be printed out. What's more, Rhapsody also accepts Maestro files allowing Maestro scores to be played and printed.

As you would expect, Rhapsody enables you to enter dotted notes, triplets, staccato and accented notes, trills, repeats and much, much more. There is also the ability to add text, so you can easily add lyrics. And five scores can be open at once allowing you to copy data between them.

All of this can be replayed via a MIDI or an Archimedes sound system, it's childsplay, as successfully proved by Julian.

In short, it makes the labour of composing (noting, writing, correcting and changing) quick and easy, allowing you time to concentrate on the important part; the music.

Just think had Schubert had Rhapsody, perhaps his famous unfinished might have been finished. **PRICE – £49.95 (inc VAT).**

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Rhapsody developed with Silicon Vision's RiscBASIC Compiler.

Software — for the — Archimedes

Equasor

An equation building tool that complements many RISC OS applications, in particular DTP and word processor programs such as Impression and Impression Junior

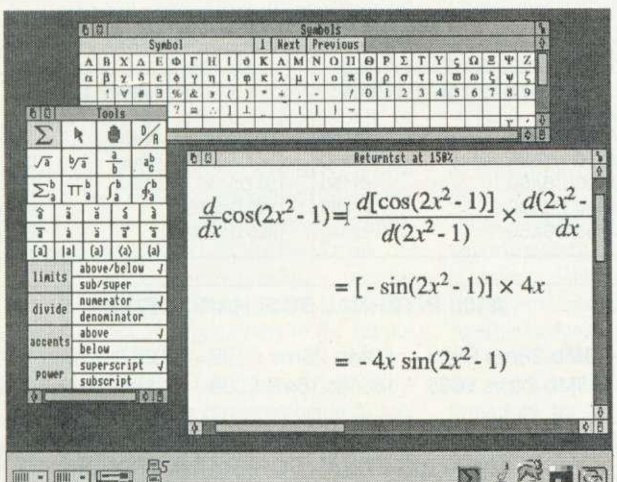
Many users of the Archimedes have a need to include complex mathematical formulae or equations into documents. Equasor allows equations to be built up on screen, graphically, from their component parts. Using the Acorn outline font system it presents a totally accurate view of the final equation at all times.

It simplifies the building of equations by presenting palettes of symbols, functions and operators which can be selected just by clicking with the mouse. It intelligently scales and re-sizes features such as summation symbols, brackets, and square roots as the equation is edited so they are always the right size.

Once the equation has been created it can be saved or exported as a Drawfile to any number of compatible RISC OS applications. In DTP packages it can be dropped into frames just like any other drawing where it can then be scaled and positioned as required.

When used in conjunction with Impression II, it can take advantage of the latter's embedded frame capability to embed equations into the text, even on the line. Once embedded in this way the equation will then flow with the text as part of the text.

Features:
Multi-tasking RISC OS application, can be run at the same time as other applications. Supports direct in-memory transfer of equations for the fastest, simplest integration with other RISC OS applications. Any number of equations can be handled at the same time. Equations can be viewed and edited at any scale. Saves equations as Drawfiles compatible with all applications that support this format. Supports multiple different RISC OS outline fonts and so is not limited to the Math/Greek font supplied.



- Supports region selection and cut, copy, paste between equations and documents.
- Styles for global control over fonts, size, spacing etc. of variables and operators. Effects give additional control over the appearance of individual parts of an equation.
- Small, compact program perfectly suitable for 1 Mbyte machines.

Included in package a 60 page spiral bound manual with detailed tutorial reference, and index. Discs include the program, example equations, and Math/Greek outline font.

£49.00+VAT (£56.35 incl.)

ShowPage

ShowPage is a PostScript compatible interpreter running under RISC OS.

Over the last 6 years PostScript has established itself as an industry standard graphics programming language. Pioneered by Adobe for use in the original Apple laser printers it is now used in all manner of output devices such as colour printers, and typesetting machines.

ShowPage will be attractive to those wanting to learn and explore this programming language and those wanting to print and use PostScript files from other machines.

ShowPage is fully multi-tasking and RISC OS compatible. It can output any PostScript file either to a window on screen, or to the currently selected RISC OS printer. It can therefore be used to make even the lowest cost dot-matrix printer PostScript compatible. When used in conjunction with LaserDirect, it can turn this printer into a very fast and fully fledged PostScript compatible laser printer.

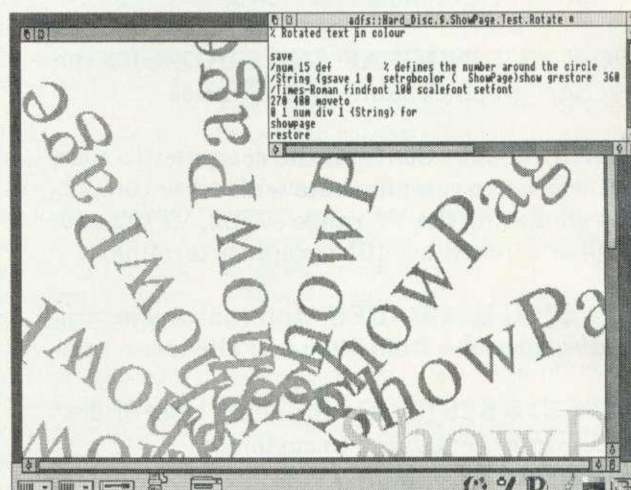
ShowPage supports the colour extensions and can create a sprite file of any required size. It can therefore be used to incorporate PostScript graphics into other RISC OS applications. It uses the RISC OS outline fonts, rather than the conventional PostScript fonts, for all rendering, so it is compatible with the wide range of Archimedes outline fonts now available for this computer.

ShowPage has a built in editor allowing PostScript programs to be created and executed directly, and interactively with the results shown on screen in another window.

Showpage is compatible with the output from Acorn PostScript printer drivers. Minimum recommended memory is 2Mbytes.

ShowPage can also be used with Laser-Direct to allow fast RISC 0S printing over Econet.

PostScnpt is a trademark of Adobe Systems Inc



Illustrates example ShowPage program and resultant output

Package includes a spiral bound manual detailing the ShowPage version of the language. 320 page PostScript language reference manual by Adobe. 240 page PostScript language tutorial manual by Adobe. Discs containing ShowPage and example programs. AvantG, BookM, Pembroke RISC OS outline fonts.

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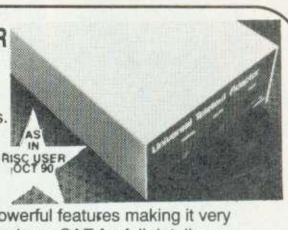
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GET THE PICTURE

Video digitisers can make graphics a lot simpler. CHRIS DRAGE takes a look at the main contenders

A video digitiser is a combination of hardware and software which makes it possible to capture video images from a TV tuner, video camcorder or player and convert them into a form that a computer can use in other applications.

To be over simplistic, it converts the analogue signals from the source into a digital form. Once the images are in a digital form all manner of graphic manipulation can take place. Images can be captured in real-time by monitoring a PAL video source on the computer screen and 'grabbing' the required image with a click of the mouse.

So why do it? Anyone not blessed with artistic talent or who doesn't have a wealth of time to spare at the computer will find a digitiser a welcome source of 'ready-made' images to work with.

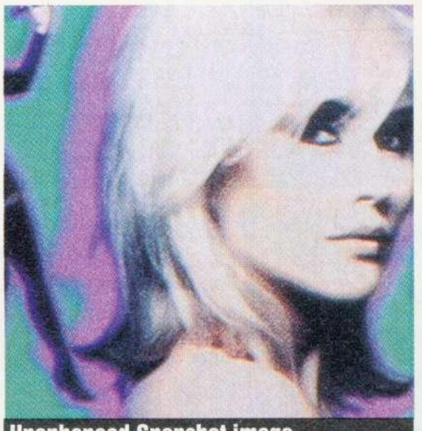
For example, video digitising provides schools possessing a camcorder or video camera with an inexhaustable supply of pictures ideal for inclusion in the school magazine or newspaper. Similarly, it provides a cost-effective means of illustrating project work, visually recording technology projects, class visits and field trips.

Travel or community brochures, personalised Christmas cards, illustrated wall displays; the list of applications in the school environment is endless.

Coupled with a laser printer and camcorder, the digitiser can even begin to pay for itself at school fetes as high quality prints of digitised portraits provide a popular alternative to instant photos!

Shopping around

Although digitisers for the BBC B and Master 128 have been around for a while now, the results on eight-bit computers leave a great deal to be desired and most aficionados would probably agree that they were more impressed with the fact that it could be done at all, rather than the quality of the images. The fact is that for acceptable results, video digitising requires large amounts of Ram and the raw processing speed that Risc technology offers. The Archimedes is a logical choice.



Unenhanced Snapshot image

Watford Electronics was the first company to bring this fact to light. The speed at which the WE digitiser displayed monochrome images brought delighted gasps from those who first saw it go through its paces in 1988.

Time moves on and the past year has seen several colour digitisers appear, some of which have been reviewed in *BAU* already. Although there are hardware differences, it is the software by which the user will ultimately judge each digitiser and this is under constant review and improvement.

The Pineapple digitiser (reviewed in *BAU* April 90 issue) comprises a hardware podule (in a special external mounting box for the A3000) and a number of accompanying programs, the most useful of which is the 'Miniature Image Check/Control Icon' (*!MICCI*).

The program offers total image manipulation and analysis. Not being multi-tasking it fits comfortably into a 1Mb machine where it runs very fast. A multi-tasking version is under development but this will require at least 2Mb in order to run.

The current version is available in both 'basic' and 'extended'' versions, the latter providing three additional facilities: anti-aliased fonts, image sequences, and the ability to edit the video Ram concurrently in four screens of increasing magnification. These features can be purchased as a £20 'upgrade'.

!MICCI allows images to be manipulated in a variety of ways: zoomed in pictures can be smoothed to reduce pixel visibility, these can be flipped in both directions, 'ANDed' 'ORed' and 'EORed' and stored on a nominated 'shadow' screen(s). Similarly, pictures can undergo a Mode change, be defocused, or enhanced by an averaging routine which updates the image a number of times – and there's lots more.

The resulting image can be saved in a variety of different ways: as an area of podule memory, as a screen image of varying size, as a sprite file or in a format suitable for use with Wild Vision's ***ChangeFSI*** or the AIM software.

Snapshot is also a colour digitiser which occupies a full-width podule and works happily with both the A3000 and Archimedes series. The podule is in fact Wild Vision's V9 board (reviewed in *BAU* July 90). It differs from the Pineapple system by having no physical controls. It has Risc OS compliant, *Snapshot* image-capture software in Rom on the board ('*SNAPSHOT*') plus (*!Enhance*) image enhancing software on disc. The *Snapshot* software automatically places a new icon on the icon bar, and clicking the menu button produces a dialogue box relating to *Snapshot*'s default status. Clicking select produces a display window for the incoming video signal with an accompanying toolbox menu containing four icons related to the moving image in the window.

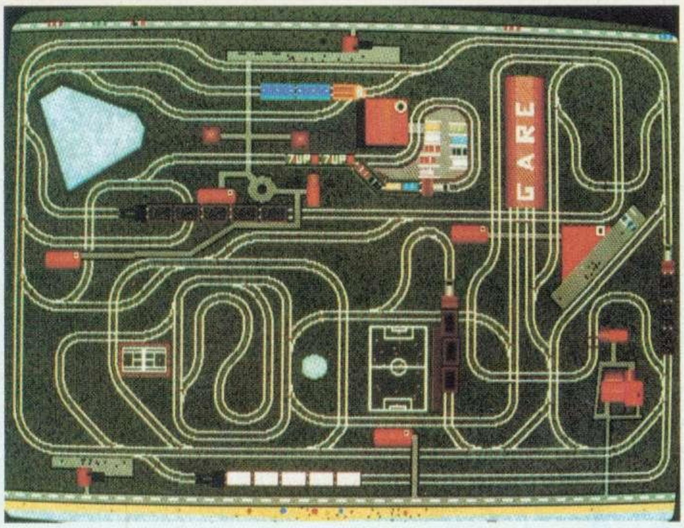
The image can be captured, saved or transferred immediately to another recognised application on the icon bar (such as *Paint*, *Draw* or *!Enhance*). An image may be sampled in either eight-bits (for speed) or 12-bits (for quality). A panel is also available with 'sliders' allowing the brightness, contrast and colour saturation of the raw image to be altered. All the really clever things are done in *!Enhance*.

With this module saved, or transferred, raw images can be manipulated in a variety of ways. They can be enhanced via error distribution on up to four pixels (the 'FSI principle').

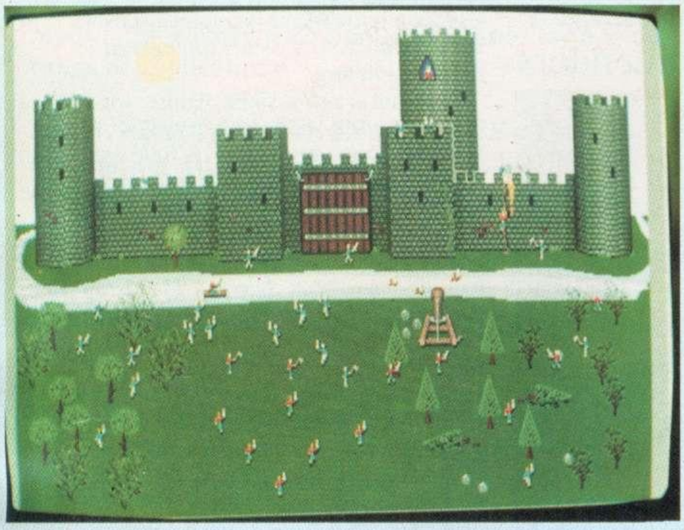
Both the individual RGB components and the tone curve (altering contrast) can be adjusted and an infinite variety of special effects obtained via a 3x3 convolution



Raw Pineapple image



With **Fat Controller** you get the power to control one of the largest railway networks in the world. Controlling the railway traffic is not an easy task.
Change the points to prevent the trains from crashing and ensure the passengers reach their destinations.
There are several levels of difficulty and increasing fun, progressing from simple to frantic. Remember you'll have the lives of the passengers in your hands - we don't recommend you to buy this game unless you feel up to handling this responsibility.
Not recommended for those with a weak heart or of a nervous disposition!



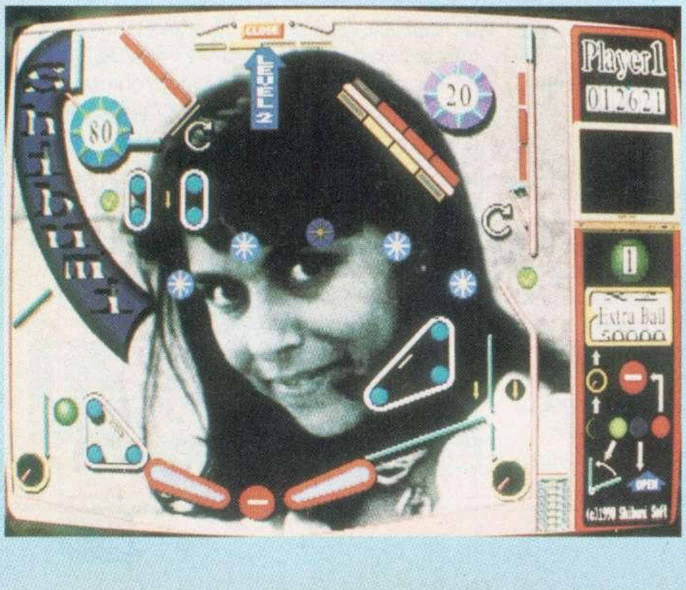
Siege



It is the year 1247. You must rescue lovely Princess Alexandra who has been kidnapped and locked up in the high tower of the black castle.
With the help of your brave men you try to save her so you can marry her, be the future King of England and live happily ever after (and have many children).
You can try to get into the castle many different ways, but whether you swim across the moat, cut down trees to make a bridge, scale the walls, dig a tunnel, smash your way in with heavy stones flung from a catapult, or just use the catapult to fling yourself in, many of your man will die before you succeed.
Several levels of exciting medieval fights, in a game that combines clever strategy with very fast action.
Swords, axes, arrows, hot oil and other medieval weapons will be used against you, so Shibumi Software can assume no responsibility for any injuries inflicted while playing this game.







ArcPinball

A very realistic pinball simulation with animated TV pictures and original songs playing during the game.

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filter. The sprite output can be scaled and can optionally be saved in monochrome and/or multisync mode. Some animation is possible via a separate movie module, but a full animation package is to follow.

If Snapshot has one significant advantage over its competitors, it must be in its intuitive approach to sophisticated image manipulation. It follows the Risc OS conventions, so offering consistency: almost no recourse to the manual is required until you get to the more subtle and clever image enhancements.

The Hawk V9 colour digitiser was reviewed fully in *BAU* July 1990 and there is little to add here, except to say that it shares the same hardware as Snapshot, yet the software (*Fastgrab*) does not compare well with Lingenuity's *Snapshot/!Enhance* combination. Advanced image processing is possible with Wild Vision's *ChangeFSI*, an extremely versatile program, but at extra cost. A3000 owners will be pleased to hear that a podule expansion box will be available soon to house the V9.

Two popular monochrome digitisers are available from Watford Electronics and Technomatic (Brainsoft) respectively.

The Watford system comprises a single width podule, a disc and two manuals. The podule has 128K of frame store memory with software in Rom possessing all the facilities to grab images, display, rotate, scale to any size or angle, saved and printed out.

A sequence of grabbed frames can also be made into an animation and some degree of colour is possible with the addition of a Colour Converter podule (Lingenuity) which is valuable for those Watford digitiser owners who now want to capture colour images.

All the commands to grab and manipulate images are accessible as * commands. The power and versatility of these commands is apparent in the stunning demonstration software on disc. *TV*, a Risc OS compliant application, provides easy access to all the image manipulation commands.

Clicking on a miniature TV icon opens the frame display area where any available video image is displayed.

A pop-up menu gives access to all the image manipulation options. The 'freeze' rate can be set and the contrast of both the picture and screen and be adjusted with sliders or automatically set to an optimum for a particular image.

A zooming window allows both the aspect ratio to be altered as well as movement of the zoom area over the picture. The really clever bits are in the 'tweaks' and 'process' submenus.

A superimpose option leads to some interesting image mixes. Pixel dithering, a 3x3 convolution filter, smoothing and flipping provide further control over the final image. Other sub-menus provide control of the shape, size and type of image to be printed/saved.

For serious image processing a monochrome monitor is really necessary to display the available 64 grey levels in an Archimedes' 256 colour mode (which means fitting links LK13/14 in an A410/440). A Philips CM8533 colour monitor is a good compromise, however.

The digitiser works most efficiently in a 16-grey scale mode which will display images on any monitor.

For economy and those who find their podule slots largely occupied, the Multipod Professional Expansion Card (Brainsoft) offers a mono digitiser among its five functional interfaces. The desktop software incorporates contrast and brightness controls, zooming, dithering, grey scaling and sprite saving. However, the digitising time is slow at 1.6 seconds, which limits it to stationary or very slow moving objects.

The value of this digitiser lies in the fact that it shares its space with a sound sampler, RS232 port, analogue port and three BBC-style Rom sockets, and this may be important to some people.



Mono image from Watford



Lingenuity colour image



Dithered Multipod image

Conclusions

The Pineapple digitiser is a professional product and its *!MICCI* software is an extremely powerful tool for editing and manipulating the images or for simply storing them as sprite files. It will be interesting to see the eventual desktop version.

Snapshot too, is a totally professional product whose Wimp software provides considerable control over the final image but does cost more than the Pineapple system. The Hawk V9 is a fine digitiser but you must pay extra for the sophisticated *ChangeFSI* image manipulation software. Readers who require digitising to professional standards should watch for Wild Vision's Hawk V10, which is currently under development.

For those whose pocket is limited, including schools with tight budgets, Watford's TV Digitiser offers high quality, low-cost monochrome digitising, which may be just what you require for outputting to a monochrome printer.

It has the further advantage of only taking up a single podule slot and costs a lot less than the colour models.

Similarly, if your needs are not too demanding, and you want to make the most of your podule space, then the Multipod card offers the most cost-effective digitiser around.

SUPPLIERS

- *The Pineapple Colour Video Digitiser* is available from Pineapple Software, 39 Brownlea Gardens, Seven Kings, Ilford, Essex, IG3 9NL Prices: Standard version £285.00 + VAT. Extended version £315.00 + VAT (upgrade cost £35.00). A3000 podule box £65.00 + VAT. PAL colour coder £69.00 + VAT.
- *Snapshot* is available from Lingenuity, Wood Farm, Linstead Magna, Halesworth, Suffolk IP19 0DU. Price: £339.00+VAT. (Price for schools £305.00).
- *Hawk V9* is available from Wild Vision, 6 Jesmond Road, Newcastle-upon-Tyne, NE2 4PQ. Price: £339.90+VAT. (*ChangeFSI* software: £22.00+VAT).
- The *Archimedes TV Digitiser* is available from Watford Electronics, Jessa House, 250 High Street, Watford, WD1 2AN. Price: £175.00+VAT.
- The *Colour Converter* (for the above digitiser) is available from Lingenuity, Wood farm, Linstead Magna, Halesworth, Suffolk, IP19 0DU. Price: £169.95+VAT.
- The *Multipod Professional* expansion card is available from Technomatic Ltd, Techno House, 468 Church Lane, London, NW9 8TQ Price: £130.00+VAT.



JAMES STAPLES reviews Minerva's suite of programs for the office

Illustration: Andrew Kingham

OFFICE SUITE

If you want to perform a variety of office tasks, without using several items of software, then *Desktop Office* from Minerva could solve your problems. The package offers five Archimedes office-related applications conforming to Risc OS desktop standards.

The five parts of *DTO* are wordprocessor, database, spreadsheet, graphs/charts and communications. Each application is deliberately limited to the most used functions – a spin off of this is reduced complexity which is a good thing for the inexperienced user.

Features common to each package are the extensive use of menus, the facilities to alter colours and options for restarting from the point where you last quit – even if the machine has been turned off. Any two applications will load on a 1Mb machine but this can drop to one application if you want to print, because the Risc OS printer drivers are used.

DTOWord

Like other wordprocessors, *DTOWord* allows you to type continuously while the program takes care of page layout.

Sections of text are handled in a way similar to Acorn's *!Edit* application. By using the mouse, a block is outlined and this can then be moved, saved to disc, deleted or even indented by a few spaces to attract attention. One word or whole sections may be underlined, italicised or made bold and single words may be searched for, and optionally replaced, with others.

Facilities, such as inserting the date or defining a new margin, are implemented by embedded command. This is not 'what you see is what you get' – you can preview the document on screen before you print, but you cannot edit in preview mode.

Although idiosyncratic, embeds like [bp], [hm] or [pn] have been used by many wordprocessors in the past, but those new to wordprocessing might dislike them.

Only one document may be in use at any one time, although it is possible to cut and paste sections from different documents via disc. *DTOWord* does not check your spelling and cannot include pictures in the text. A thoughtful feature allows the size of, and space around, text to be increased.

DTOBase

A database provides an easy way to store and retrieve information. Opening a *DTOBase* file brings two windows onto the

screen, one showing data, the other a set of tools. The data is presented as a card which has details of a specific subject – perhaps a book, a country or a person. The user specifies the size of the card and nature of data.

You can browse through the file card by card, or a single card may be found. The file may also be searched and a group of related cards formed. Minerva's *Flexifile* database (see *BAU* Jan 91) has 24 groups – *DTOBase* has one.

A report may be created which can consist of all the cards in the file, or a previously searched group. It may be printed or exported to disc, or another application. The file can be sorted and this affects both browsing and reports.

DTOSheet

A spreadsheet is a grid of cells, each containing a number, a formula (calculation) or a label (text). Horizontal columns are usually alphabetical and the vertical rows are numbered, so each cell is identified by a reference, for example, A1 or C13.

The maximum size of a *DTOSheet* page is 55 columns by 99 rows. Entry and editing of cell contents is via a tools window, which alters cell formatting – justification (left, right or centred), the number of significant figures for decimal numbers or whether a value is to be preceded by a £ sterling sign.

Calculations are performed by referring to cell references. The following formula might be entered into cell D5: (A1- B7)/ C3. Instead of the formula being displayed, the result is shown in the cell. *DTOBase* automatically recognises formulae.

A block copy similar to *DTOWord*'s copy feature saves typing when defining a sheet. The block copy can also save selected parts of the sheet or export to other applications.

DTOChart

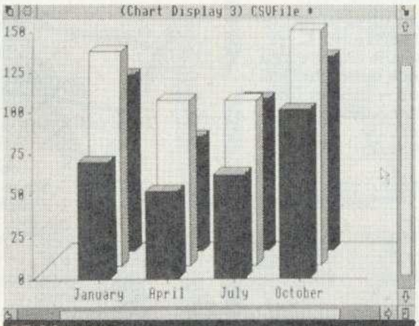
This is my favourite application in the suite. It creates graphs or charts from the output of other applications. Once data is in *DTOChart*, it can be displayed in a variety of ways – as a bar, line, scatter or pie chart – in various colours. Scale can be set or left to the application to sort out.

Up to three sets of data can be overlaid per graph and one item in a set can be emphasised. In the case of a pie chart, this moves that segment out of the 'pie'. Line and scatter graphs have dotted lines connecting the emphasised item to both axes.

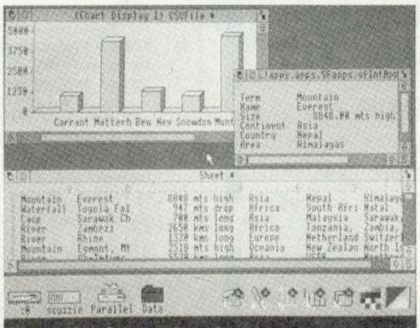
DTOComms

Bulletin boards run over the telephone and users swap ideas, hold meetings, leave messages and play games. Many boards charge for their services.

To communicate over the phone, your Archimedes needs a modem. This device is controlled by software running from the computer – in this case, *DTOComms*.



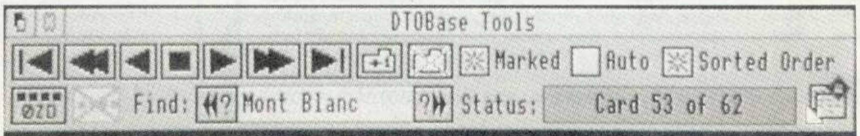
3D histogram



Importing/exporting data



Information found



DTOBase tools window carries subject details

Different boards operate in different modes – *DTOComms* provides Ansi and TVI925 emulation modes – letting you access the Telecom Gold service, for instance. Modems require configuration, so *DTOComms* provides a menu to set these up correctly.

It also provides 19 commands for Hayes-compatible modems, allowing the user to write scripts which can configure the modem, dial a board, log on with password or account number and go straight to a frequently used service.

Integration

Data is passed between applications either via disc or directly in two formats: text or CSV (comma separated values). A *DTOBase* report might be loaded into *DTOWord* as plain text, while numeric output from *DTOSheet* to *DTOChart* is CSV.

The finest example of integrated *DTO* applications is *DTOWord* 's [fl] embedded command. This inserts part of a *DTOBase* card into a document – for example 'Dear [fl name]' might be printed out as Dear Mr Smith, thus mail-merging is possible.

DTOChart relies on integration as it doesn't generate data itself. *DTOBase* can export all or just part of a card and *DTOSheet* follows a similar method for outputting sheets.

Conclusion

You are not obliged to use all of the suite so if you have bought an Acorn Learning Curve package then *First Word Plus* might replace *DTOWord* as your wordprocessor. If *DTOBase* proves that you do have a requirement for serious database use you can upgrade to, say, Minerva's *Multistore*.

A few things trouble me. One is *DTOWord*'s embedded commands – a friendlier form of implementation would have been welcome. The manual contains some clangers, although Minerva does run a telephone help service.

If you need an all purpose office system, then *Desktop Office* is certainly value for money as the total cost is split between five applications. Each is easy to learn and use, providing reliable data interaction with other Risc OS applications and outside options.

If you want basic office tasks done in a productive manner, this could be just what you are looking for.

Desktop Office *costs £130. Contact Minerva Software on (0392) 426160.*

GAME SHOW



Keep an eye out for Crisis

A year ago I was wondering what the new decade would bring the Acorn games world. A proper slot for the Archimedes alongside the Amiga games scene perhaps? A demise of BBC games or possibly a new lease of life for the Beeb market? At the time, the two most prominent games producers, Superior and the Fourth Dimension, described the Beeb market as perfectly worthwhile, though Superior said it was hoping for a larger slice of the Archimedes scene. The Fourth Dimension already had that but now its BBC output has dipped, perhaps to the advantage of Arc gamesters. In very broad terms, Superior looks after the BBC market and the Fourth Dimension caters for the Archimedes. A year into the new decade, what do the two companies say about this situation?

Superior is happy to admit its dedication to the beeb market. Steve Hanson told me 'if there is a decline, it's a very slow one. There are so many machines out there, many of which are changing hands. We still sell *Elite* to new owners of second hand machines, believe it or not, and the *Play it Again Sam* series is still very popular – in fact all the Sams seem to sell equally well. (could it be the name? – Ed). Of course we'll continue to produce new games and a few more mega-games are in the pipeline.'

The Fourth Dimension has no particular policy on whether games are written for the Archimedes or BBC, according to Steve Botterill. 'We're a fairly democratic company. We don't whip our programmers into writing particular games, it just so happens they mostly enjoy writing Arc software and that's the way it's turned out. But if someone writes a really good Beeb game...' If any readers have comments on the subject, please write in to the address below.

One of the mega-games in Superior's pipeline will be a flight simulator called *Superior Flight*. Steve Hanson explained that they were originally planning to put *Aviator* on the next *Play it Again Sam* package but then reconsidered. '*Aviator* was very good, but does look a bit dated now. We saw how flight sims have developed since then and decided to write a brand new one for the Beeb taking the best features from *Aviator* and the others.' Peter Scott is working on the main routines now and hopes to have the whole game ready for playing in the summer.



Powerband gets the chequered flag

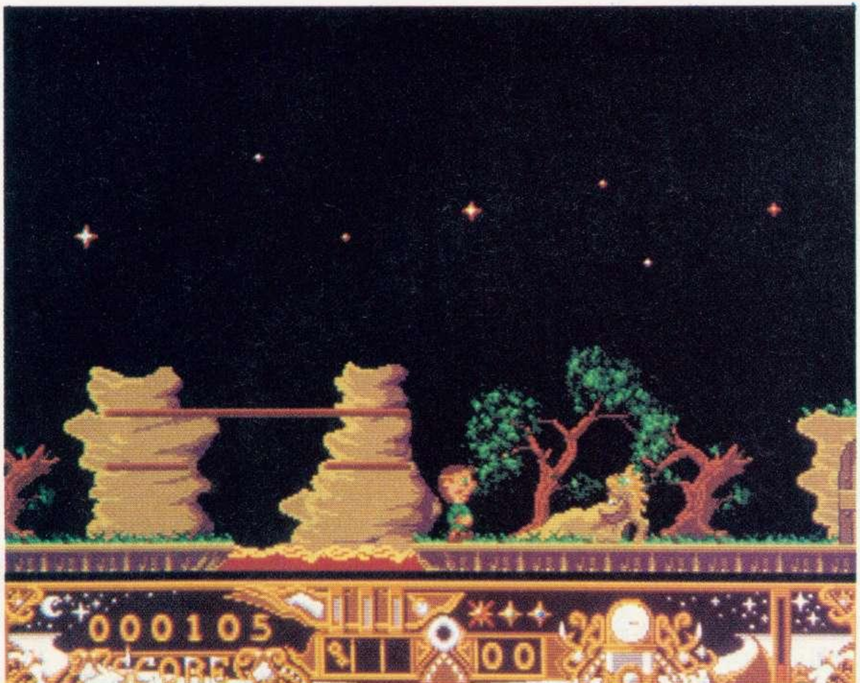
At the Computer Shopper Show last month there were several interesting new things. *Chocks Away Mark II* was on display on the Fourth Dimension's stand, having been suddenly sprung on us in typical fashion by the Fourth Dimension's perfection department (Mark).

Chocks II exists as a free upgrade to original buyers and as standard issue in new sales. Improvements include a boosted frame rate (about 70 per cent faster) and, interestingly, clouds, though they look a little strange. To obtain a free upgrade send 4D your flying manual, name and address, and it will return the manual with an extra disk to convert your old software. This way your old pilot status is unaffected by the transfer.

A company called The Serial Port was demonstrating a new joystick interface for the Archimedes. It fits in the printer port and, like a dongle, allows the printer to remain connected.

If you already have a dongle belonging to *Impression DTP*, it is possible to purchase a long cable to take all the bulky hardware somewhere out of the way! The interface comes with a suite of software, including its own language and compiler. You can program movements of the joystick to represent certain key presses, then the compiler creates a module based on these. Different modules can be created for all your games, then included on the disc for that game.

In fact joystick modules for about thirty games are supplied with the joystick. The programming language and compiler enables the joystick (in fact 'joysticks' because two can be connected at the same time) to be used to control virtually any piece of software. Since the RTFM inter-



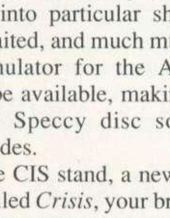
Twin Worlds: familiar but nice

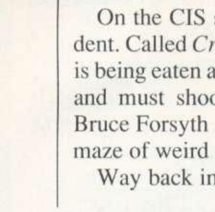
face (reviewed last month) does not do this, the Serial Port's effort is the best buy of the two. The interface costs £23.99 and The Serial Port is on (0243) 531194.

The Arxe stand was sprouting new games, partly because Arxe is now selling games written by French company Eterna (who used to be called Sisteme). The latest, called *Tactic*, is based rather loosely on *Tetris*, the idea being to arrange falling spheres into particular shapes. Also, the long awaited, and much mused over, Spectrum emulator for the Archimedes will shortly be available, making it possible to use any Speccy disc software on the Archimedes.

On the CIS stand, a new game was evident. Called *Crisis*, your brain is in one and is being eaten away. You control an eyeball and must shoot small animated icons of Bruce Forsyth and collect small brains in a maze of weird things.

Way back in the October issue you may remember that I voiced a moan about Archimedes games reconfiguring the machine, not providing a quit facility once you've finished, and then dumping you somewhere in oblivion, rather than cleanly returning to Desktop. Then in the December issue we printed the opinions of one J A Briant who pointed out that games tend to use 'illegal' code so continuing work in Desktop might be dangerous. Besides, he said, programmers want to be sure there is no trace of the software to copy, so in balance a hard-reset is acceptable.



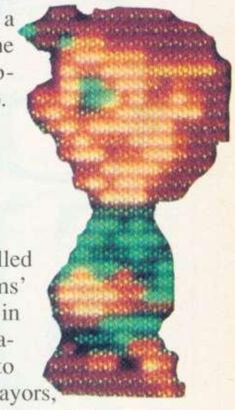


Well now we have a third opinion, from James Byrne of Cygnus Software in Leicester. He disagrees with J A Briant, saying that a well written program should be able to tidy up after itself whether or not it uses illegal code. He uses Cygnus' game *Twin World* (see review) to illustrate his point. James says the claim that tidying up is not possible because of illegal code is just an excuse for sloppy programming.

Well, is it? Should all games start from Desktop, behave themselves and then return to Desktop without fuss, or is this too much to ask? This debate is becoming quite interesting. I want more opinions. Send them in to Game Show at the address below.

A game called *The Crunch* is on the way from Eclipse, known for *Blowpipe* and *Worldscape*. It has a concept similar to a game sent in by a reader recently – and you'll be hearing about that soon – in which a small robot roams a 2D maze. The maze contains coloured tiles, invisible transporters and one-way areas. Once a colour has been chosen all the tiles of that colour must be consumed before eating another shade – and that's 'the crunch' because each level has been designed in such a way that only careful planning will render the last colour edible.

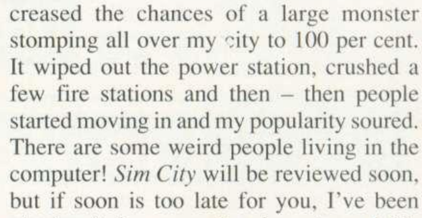
On the subject of mazes, a two-player split-screen labyrinth game ought to be rearing its head pretty soon if predictions are correct. Speaking of rumours, we've heard that a driving simulator is on the way involving a two-player serial port link up.



I've been playing Superior's *Sim City* for the BBC. Hey, it's good! The idea is to build up and maintain a city – I called mine Samville. The 'Sims' (simulated citizens) live in the city, and the population varies according to factors such as taxes, mayors, taxes, crime and taxes – to quote from the instructions. The residents of Samville hate me because I give them coastal locations, parks and police protection (yeah, and I'm confused too). The industrialists love me because they get workers and large water supplies, and the commercial zones are thriving because I base them near stadiums which attract lots of customers. But the people just don't want to live in Samville.

I got so frustrated in the end that I increased the chances of a large monster stomping all over my city to 100 per cent. It wiped out the power station, crushed a few fire stations and then – then people started moving in and my popularity soured. There are some weird people living in the computer! *Sim City* will be reviewed soon, but if soon is too late for you, I've been playing it for a couple of weeks and it's great – no complaints so far.

Powerband, from the Fourth Dimension, should be finished by now. I had a quick race at the Shopper Show but the impatient visitor behind me was itching for a go so I didn't have time to form a very strong opinion. Basically though, your 3D racing car can be viewed from any angle, and driven in any of four modes. Fun mode seems to be similar to 'flying brick' mode in *Interdictor II* in which the plane becomes indestructible. In *Powerband* fun mode the ability to reverse is particularly useful after miraculously surviving a 260mph trip into a grandstand. Game mode provides track practice, while in timed mode pole position is the aim. The final mode – world cham-


Joysticks for the Arc

pionship – is the real nitty-gritty: Formula One racing, in which your car takes a beating and is quite prone to failure. The Fourth Dimension certainly thinks it's good enough to warrant a £24.95 price tag, unheard of since *Apocalypse*.

Some news in brief: *Wonderland*, the new adventure from Magnetic Scrolls, should now be available for the Arc from Virgin. *Superior Speech* is an Archimedes version of the highly acclaimed BBC *Speech!* from Superior Software, and ought to be on the shelves by now or very soon.

Any news, hints, tips or general comment, and particularly your opinions about the BBC/Archimedes markets and the Desktop games question, should be sent to: Game Show, BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ.

Happy new year.



Kaptain Konflikt nooks da gooks

Twin Worlds

Cygnus Software, tel: (0533) 559711
Archimedes £19.95

Before anyone rushes out to buy this, hoping to solve the mystery of 'Who killed Laura Palmer?', let me tell you now. This has nothing to do with Twin Peaks!

Twin Worlds is in fact set in a far off world, inhabited by demons and wizards. You play the part of Ulopa, and must find the 23 parts of the magic amulet, once owned by your father. Your father incidently, is now pushing up the daisies, courtesy of the evil druid, who also stole the amulet in the first place.

The overall game is in the now-familiar ladders 'n platforms style. Each level is divided between above and below ground, hence the 'Twin Worlds'. The top bit runs parallel to the bottom bit allowing you to get around obstacles by descending, moving along a bit and then reemerging further on (or vice-versa).

A novel feature, is the presence of a merchant, who will sell you useful items in return for points you have scored. A flute is required to summon the merchant, a number of which are scattered throughout the land (flutes, not merchants!).

The druid's 'nasties' are scattered throughout the land and can only be stopped by pelting them with red, green or blue bubbles. Each type of bubble has its own particular use and different ones are required for destroying different monsters.

On the graphics front, the backgrounds and sprites are a direct port from the Atari ST – the gaps at the top and bottom of the screen are a dead give away. I know this is the easy way out but a little enhancement goes a long way (just have a look at the difference between the ST and Arc versions of *Pipemania*.) All motion in the games is smooth and the main character Ulopa trots around in a rather cute, wibbly-wobbly sort of way.

The sound fairs a little better, especially played though a hi-fi. Sound effects are rather thin on the ground (and below the ground) with only the odd blip when you launch a bubble.

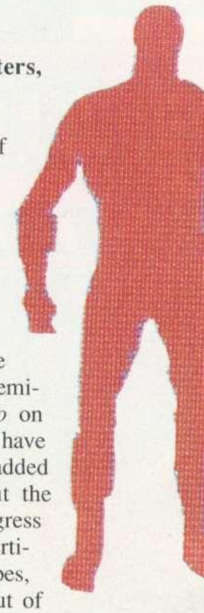
It's excellent to see another large games software house supporting the Archimedes. Let's hope this is the first of many.

No prizes for originality, but a welcome addition to the Archimedes games library nonetheless.

Rob Miller

Kaptain Konflikt

Calderglen Computers,
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Archimedes £19.99



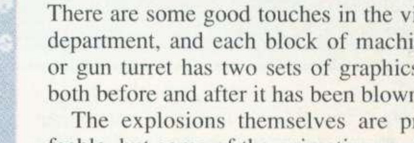
Hot on the heels of *Deeva*, (the only game in the history of the home computer to have incorporated a scrolling starfield which went the wrong way), comes a new title from the same company, somewhat reminiscent of *Commando* on the BBC. The version I have will be improved and added to before release, but the general idea is to progress through a series of vertically scrolling landscapes, blasting merry hell out of all who stand in your way. On your destructive travels, you can collect various bits of equipment to help you: extra grenades and 'first aid' boxes which regenerate your energy level for example.

Currently there are six levels (which are viewed from above), including land, water and city scenes, but no doubt this will be increased. The graphics are rudimentary but adequate, however it may have escaped the artists' notice that every piece of vegetation looks like an enormous mutant lettuce! There are some good touches in the visual department, and each block of machinery or gun turret has two sets of graphics for both before and after it has been blown up.

The explosions themselves are pretty feeble, but some of the animation, such as the way the cannons emerge from underground, is nicely done. Scrolling is flicker-free, and a tiny flying machine can be hijacked to glide at double speed across the terrain with no loss of smoothness. You must avoid the cars and aircraft which glide by at intervals whilst dealing with the advancing hordes of enemy troops, and doors must be blown open to get at new supplies.

This is sometimes difficult, since the one-way scrolling can prevent you from throwing the grenade from far enough away. I couldn't help noticing that the bazooka-wielding character on the title screen bears a striking resemblance to Mel Gibson and I'm sure this game would be his cup of tea. Nevertheless, regardless of the price, I would say that this is only slightly better than budget-quality software.

Mat Tizard



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CITY SLICKERS

CHRISTINA NEAL joins the Arc on the set of Capital City



If you've recently sat down for a quiet night in front of the television and found yourself ogling an Arc, you might be fearing for your health and sanity. You could be fooled into thinking that those endless hours spent writing your latest program have resulted in a mental picture of the Arc appearing before you each time you try and switch off. Rest assured though, your sanity is definitely not in jeopardy, as the Arc has been appearing on television in frequent bouts of late! That trendy yuppie bunch on the set of *Capital City* have been known to turn to their Arc for help while predicting which way the stock market will swing. And the not-so-trendy Max has been known to sit poised in front of an Arc monitor, glued to his flight simulator game!

The man to blame for your temporary fears is Ira Curtis-Coleman. The former design engineer was asked by the show's producers to find a network of computers for the programme's dealer room set. He didn't have to go far for the right machine.

Ira, who has organised video and computer equipment for the likes of *Aliens*, *Superman 4* and Bond movies such as *View To A Kill* and *Never Say Never*, already had a certain type of machine in mind.

'I wanted to use a British manufacturer, and seeing as my brother Harvey was the director of Acorn at the time, I thought I would give him first bite of the cherry.'

Aside from these family connections, Ira wanted to use the Arc's speed. A 'test run' featuring the Arc, and other competitors such as the Commodore Amiga and an IBM emphasised the power of the machine.

'I put the same program into all of them and found the Arc ran about 17 times faster than the other machines,' says Ira.

This no doubt pleased Harvey Coleman, who eagerly provided his brother with a number of Arc 440s. Ira installed these on the set, and this consequently led to the Arc's prominent role in the programme!

Ira admits that installing the computers was a complex task, even though the whole dealer room set was essentially constructed in a mere matter of weeks.

'I wanted to create realistic images of a dealer room, but at the same time, I wanted the computers to be used,' he says. I had 19 computers and some video tapes for recording information to go on the screens.

The information concerning the stock market and shares was provided by Reuters, the worldwide news agency. Ira admits that he had to take great caution over what was used. For instance, it wasn't advisable to use a page of figures produced by Barclays Bank! Instead, Ira selects and displays information provided by foreign banks that aren't linked to British ones in any way. In addition, some of the information is provided by Prestel. Other news snippets are picked up on the Amiga and run under the BBC emulator.

'I wrote most of the software myself' says Ira. 'I used *Microsoft* so that I could add windows. I also included a language called Fast Basic to get the speed right.'

'Going into assembly language to write calculations was tough. There are other screens in the background which I've preprogrammed and put onto video tapes. All the machines are driven through one source so that they are all synchronised together.'

The network of Arcs are all controlled by one main machine which Ira operates in his control room during the filming process. This is done by creating a computerised electronic path field which allows any one monitor to connect to any source.

In other words, Ira can send out information to every screen in the dealer room. This is particularly useful for occasions when the actors are filming a closing down scene, as all the information can disappear from their screens instantly.

A recent episode of particular interest to Arc owners was the one featuring Chaos. The Chaos theory aims to prove how a number of continual errors can mount up to results that are totally unpredictable – especially where figures are concerned!

The episode featured a young lad named Danny showing Max and Hudson how Chaos theory works, and the different ways that the stock market can go.

One final but pertinent question that's no doubt crossed your mind is, do the actors actually get involved in operating the computers? Can Douglas Hodge, who plays smoothie Declan, use his Arc for real?

'He's been known to play around with it, yes,' smiles Ira. 'But the whole system is controlled by me because the actors have enough to do learning their lines. We've produced a computerised dealer board which is similar to a real dealers' phone system where they just hit a certain button to dial up a line. With this, they just hit the key and it will, for instance, create a list onscreen of all the world's banks.'

'The actors have a great deal of admiration for the system. They've got a lot on their plate, so they appreciate a system which is reliable and easy for them to work with when the cameras are rolling!'